

Does the Extended International
Classification of Functioning Disability
and Health Core Set for Stroke, capture
community stroke intervention?

Melissa Evans

A thesis submitted to Auckland University of
Technology in partial fulfilment of the
requirements for the degree of Master of Health
Science (MHSc)

2014

Faculty of Health and Environmental Science

Dedication

I would like to dedicate this thesis to the patients of the community stroke rehabilitation service whose case notes provided the data for this thesis.

Acknowledgements

I would like to thank the following people who have contributed to the development of this thesis:

My supervisors Clare Hocking and Paula Kersten, whose guidance and support have helped develop my thinking and writing and have given me the self-confidence to complete this project.

My mother, Jean whose love and encouragement have sustained me in the journey.

My husband Peter who has provided practical support by taking over the house work so that I had more time to study, and making me realise when it was time for a break to clear the head and start afresh.

My children Connor and Liam, who have been accepting of the time that was needed to complete this work, and are now proud of their mother's achievements.

The community rehabilitation stroke team who allowed me to use their patient notes, and met with me to provide feedback on the coding of interventions and the research results.

The ethical committees who gave ethical approval for this project: the Northern Regional Ethics Committee: NTX/12/EXP/083 on the 13th April 2012, the Auckland District Health Board Ethics Committee: A+5492, NTX/12/EXP/083 on the 30th April 2012, and the Auckland University of Technology Ethics Committee: 12/138 on the 5th June 2012 (Appendix A).

The community stroke rehabilitation employee who was paid to anonymise the 20 patient case notes.

Amy Jones who patiently taught me how to use Excel so that I could analyse the research results.

Sue Knox who was paid to format the thesis and consequently has saved me many hours of time and frustration.

Thank you to all of you

Attestation of Authorship

“I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.”

Signed: 

30th March 2014

Abstract

The aim of the study was to evaluate whether the Extended ICF Core Set for Stroke (EICSS), which is intended to represent the functional problems of people with stroke, captured the interventions of a community stroke rehabilitation team. The study was initiated as the EICSS may not represent the diverse cultures and environments in which it will be used, it may over represent the body function categories, and it may not adequately represent the perspective of patients who live in the community. In order to achieve the aim, interventions from 18 patient case notes from a community stroke rehabilitation service in New Zealand were extracted and retrospectively linked to codes in the EICSS. Data were gathered on the type and frequency of coded interventions provided to Māori and non-Māori and by each team member. Analysis revealed that 98.8% of interventions provided by the community stroke rehabilitation team could be linked to the EICSS, which supports the validity of the ICF and EICSS in NZ. The interventions that could not be coded were linked to the categories *d660 assisting others*, *s760 structure of trunk* and *e535communication services, systems and policies*. It was also found that the walking and moving around codes had duplicate meanings and posture and neglect of the body were not clearly described. These findings can be considered by the ICF update committee for inclusion in new versions of the ICF. Comparing the EICSS and the interventions of the community stroke rehabilitation service revealed that the service is providing limited emotional and relationship interventions, which indicates that patients may not be receiving appropriate support. Additionally, more interventions were focused on body impairment rather than activities and participation, and this trend was more pronounced for Maori patients. These findings were corroborated by the rehabilitation team members. The predominance of

impairment focused interventions may mean that patients are not receiving interventions that will help them develop or return to valued activities. This research confirms that by comparing interventions to the EICSS, it is possible to evaluate whether the service is addressing the full range of patient problems identified by the EICSS. Due to the small sample of patient case notes and because the case notes were not randomly selected, the results cannot be generalised to other community stroke rehabilitation services. Further research is recommended with other community stroke rehabilitation services to further validate the use of the EICSS in NZ and to collect information which would serve as benchmark to compare community stroke rehabilitation services. This study will be of interest to people who either provide community stroke rehabilitation services or are patients of this type of service. It will also be of interest to health professionals and managers of health services who wish to introduce the International Classification of Functioning Health and Disability (ICF) as a guiding health model on which to structure delivery of services.

Contents

Dedication	ii
Acknowledgements	iii
Attestation of Authorship	v
Abstract	vi
List of Figures	x
List of Tables.....	xi
Chapter 1. Introduction	12
1.1 Overview of the EICSS	12
1.2 Rationale and Introduction to the Present Study	18
1.3 Context of the Study	18
1.4 Overview of the Thesis.....	21
Chapter 2. Literature Review	24
2.1 Search Strategy	24
2.2 Development of the ICF Core Sets.....	25
2.2.1 The preliminary studies contributing to the development of the Comprehensive and Brief ICF Core Sets for Stroke.....	26
2.2.2 Consensus conference to develop the Comprehensive and Brief ICF Core Set for Stroke	30
2.3 The Extended ICF Core Set for Stroke	32
2.3.1 Acute and post-acute ICF core sets for patients with neurological conditions.....	33
2.3.2 The consensus conference to decide on the acute and post-acute ICF core sets for neurological conditions	36
2.4 Validation of the Extended ICF Core Set for Stroke from the Perspective of Health Professionals	38
2.4.1 Validation of the ICF core sets for acute and post-acute neurological conditions.....	41
2.4.2 Validation studies of the EICSS from the patient's perspective	42
2.5 Summary	45
Chapter 3. Methodology.....	47
3.1 Aims and Objectives	47
3.2 Methodology	48
3.3 Ethics	48
3.4 Eligibility Criteria.....	49
3.5 Linking Interventions to the ICF	51
3.6 Linking Rules	54
3.7 Reliability	56
3.7.1 Review of coding decisions	58

3.7.2	Difficult coding decisions	60
3.7.3	Method used to count the data	61
3.8	Analysis	65
3.9	Level of disability	68
Chapter 4.	Results	70
4.1	Feedback on the Results from the Community Stroke Rehabilitation Team	96
4.2	Summary	97
Chapter 5.	Discussion of Findings	99
5.1	Gaps That This Study Has Addressed	99
5.2	Research Objective A:	100
5.2.1	Interventions that did not link to the EICSS	100
5.2.2	Coding spatial neglect	101
5.2.3	Providing patient education	102
5.2.4	Intervention for posture and postural alignment	104
5.2.5	Difficulty coding walking	104
5.3	Research Objective B)	105
5.3.1	Body function interventions	105
5.3.2	Emotional functions and relationships	107
5.3.3	Community social and civic life	108
5.3.4	Environmental factors	110
5.3.5	Māori compared to non-Māori	111
5.3.6	Health professional focus	112
5.4	Strengths and Limitations of the Study	114
5.4.1	Strengths	114
5.4.2	Limitations	114
5.5	Implications of the Research	116
5.5.1	Value of the study	116
5.6	Theoretical Implications of Findings, and Their Influence on Understanding or Application of Knowledge	119
5.7	Recommendations	121
5.8	Conclusion	123
Appendix A1	Ethical approval from the Northern Regional Ethics Committee	125
Appendix A2	Approval from the ethics committee Auckland District Health Board	127
Appendix A3	Approval letter from the AUTECH	128
Appendix B1	Sample of coding interventions to the ICF for Māori and health professionals	129
Appendix B2	Sample of coding interventions to the EICSS	130
Appendix C	Categories identified as missing from the CICSS and EICSS	131
References	132

List of Figures

Figure 1. Diagram of the ICF model.....	15
Figure 2. A comparison of disability level using the admission Barthel Index score for eight Māori and eight Non-Māori.	72
Figure 3. Frequency of interventions for the EICSS Body Function and Body Structure categories.....	79
Figure 4. Frequencies of interventions coded against EICSS Activities and Participation	82
Figure 5. Frequencies of interventions coded against EICSS environment.....	84
Figure 6. Total frequency of EICSS codes under 26 headings	87
Figure 7. Frequency of health professional interventions linked to 26 EICSS headings	91
Figure 8. A comparison of coded interventions by EICSS headings to Māori and Non-Māori.....	95

List of Tables

Table 1. Search terms used for literature search on the Extended ICF Core Set for Stroke (EICSS).....	25
Table 2. Coding guidelines	59
Table 3. Headings used in graphs	67
Table 4. Characteristics of Māori.....	71
Table 5. Characteristics of non-Māori	71
Table 6. Total frequency and percentage of interventions, linked to the ICF and EICSS components	73
Table 7. The five most frequent categories in each ICF component	74
Table 8. A comparison between the number of EICSS interventions per chapter and the chapters present in the data.	76
Table 9. The total number of interventions coded against each EICSS category for body function and structure.....	78
Table 10. The total frequencies of interventions coded against each EICSS category for activities and participation	81
Table 11. The total frequencies of interventions coded against each EICSS category for the environment.....	83
Table 12. Percentage of interventions linked to 26 EICSS headings for each health professional.	89
Table 13. Break down of selected headings in Table 9, which have a high number of interventions from more than one health professional.....	92
Table 14. Interventions for muscle functions, muscle endurance functions and control of voluntary movement under third level ICF categories provided by health profession ...	93
Table 15. A comparison of interventions per EICSS headings to Māori and Non-Māori	94

Chapter 1. Introduction

The International Classification of Functioning Disability and Health (ICF) and its associated core sets, have the potential to improve patient health by providing a common language to collect information on functioning that can be used in rehabilitation, research, policy and service evaluation (World Health Organization, 2002). To become a useful tool in stroke rehabilitation the Extended ICF Core Set for Stroke (EICSS) needs to undergo a validation process in different health care settings across the world. The present study aims to contribute to this process as it retrospectively reviews patient records to evaluate if the EICSS fully represents the interventions carried out by a community stroke rehabilitation team. In addition the present study also investigates whether the EICSS can contribute to service evaluation. In order to achieve these aims, the interventions of 18 patient records were extracted, linked to the EICSS codes, and the frequencies for each code were recorded and analysed.

1.1 Overview of the EICSS

The EICSS core set is drawn from the ICF which was developed by the World Health Organization as a reliable classification and coding system to describe health and disability at the individual and population level (World Health Organization, 2001). In the ICF, the term “health state” is the level of functioning in a given category or chapter of the ICF (World Health Organization, 2001). The value of clear descriptions of health has meant that the ICF has become an international language to collect and compare clinical and research health data, develop public policy, and evaluate health outcomes and services (Üstün, Chatterji, Bickenbach, Kostanjsek, & Schneider, 2003). The classification system is arranged under the main components of the ICF i.e. body

functions, body structures, activities and participation and environmental factors. The personal factors component has not yet been classified. The content of each component is outlined in broad titles called chapters. Within each chapter, behaviours or functions are categorised, described and coded. The categories within each chapter are arranged in a hierarchy from more general second level descriptions to more specific third and fourth level descriptions. This allows the user to pick the level of detail that is best suited to the user's purpose, i.e. one can use the chapter headings to outline the issues broadly or use the second, third or fourth level descriptions to give a detailed view of the issues (Üstün et al., 2003).

The ICF is based on a conceptual model, which proposes health and disability are the result of complex interactions between a person's health condition, the individual and the environment (Marsala & Petretto, 2010). The interactions between the ICF components are bidirectional. For example: a person's health condition may affect his or her activities and participation, and the reverse can occur, whereby the activities and participation of the person may affect the health condition (World Health Organisation, 2001). As a result it is now possible to use this model to analyse the contributing factors that are limitations, restrictions, barriers and facilitators to people's functioning.

A diagram of the model is presented in Figure 1, and the components of ICF model are described below:

- The health condition of the person, which affects all the components of the model;
- Body functions both physiological and psychological;
- Anatomical body structures;

- Impairments: defined as a loss or deviation in body functions or structures;
- Activities: defined as the execution of a task or actions which reflects the individual's perspective of functioning;
- Activity limitations; or reduced capacity for task or actions;
- Participation: involvement in a life situation and represents the social perspective of functioning;
- Participation restrictions: problems an individual may experience in involvement in life situations. A participation restriction is determined by comparing an individual's participation to what is expected for a comparable person without a disability;
- Environmental factors: the physical world, the effect of people, attitudes, values, social systems, policies and laws. The environment can act as a facilitator or barrier on a person's health;
- Personal factors are those that relate to the individual, for example a person's age, gender and life experiences (Gerold Stucki, Ewert, & Cieza, 2003).

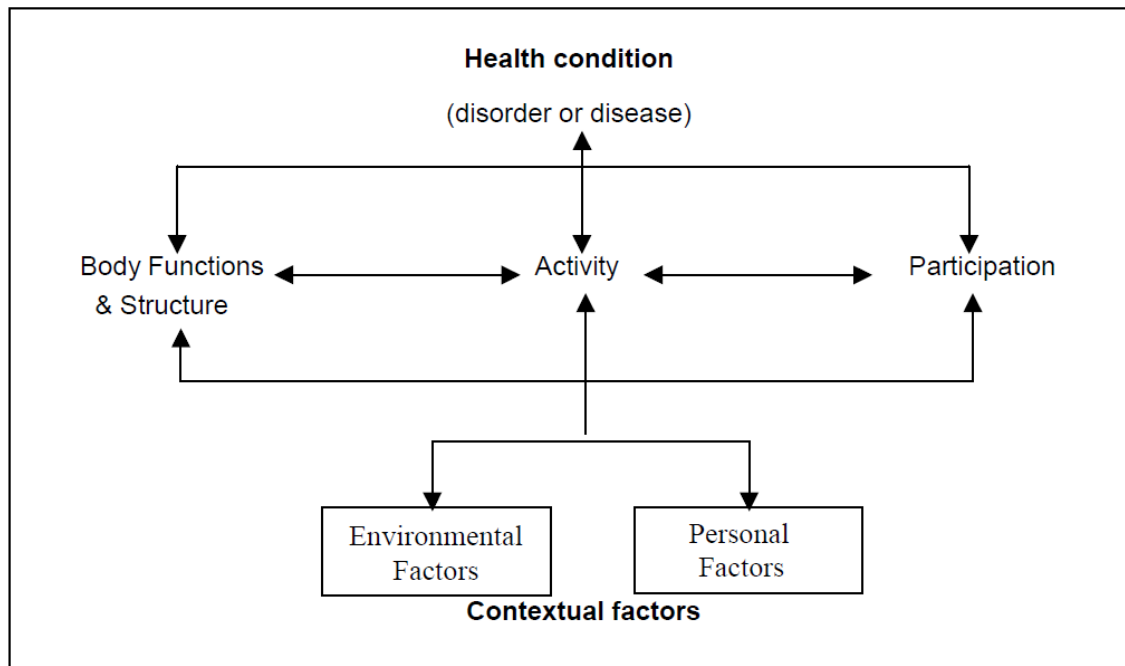


Figure 1. Diagram of the ICF model.

From “Towards a Common Language for Functioning Disability and Health ICF” by the World Health Organization (2002) p. 9. Copyright 2002 by the World Health Organization. Reprinted with permission.

The development of the ICF began in 1993, in response to growing dissatisfaction with the previous classification system the International Classification of Impairments, Disabilities and Handicaps (ICIDH). The revision process consisted of identifying a large pool of categories that described functioning. Drafts of the new classification system were field trialled in many countries to test its application across different cultures, and languages and for its reliability and utility. Findings from the field trials, and feedback from experts, governments and disability groups was incorporated into a final draft, which was officially accepted by the WHO in 2002 (Üstün et al., 2003). At this time it was recognised that the ICF would need to be continually updated. In 2011, the ICF Update and Revision Committee (URC) set up a web based system, which allows users to enter and review proposals for ICF updates (Kostanjsek et al., 2011). These structures ensure the ICF is a living document and responsive to new findings on the use of the ICF in clinical practice.

Core sets are selected categories from the ICF that represent the typical concerns of a person with a specified health condition. The choice of categories in a core set has been based on synthesised research findings from clinicians, patients and researchers, and collective decision making via a consensus conference. The EICSS has 166 categories and is a combination of three core sets; 130 categories came from the Comprehensive Core Set for Stroke (Geyh, Cieza, et al., 2004), and 36 categories came the Neurological Core Sets for Patients with Neurological Conditions in Acute Hospital (Ewert et al., 2005) and the ICF Core Set for Patients with Neurological Conditions in Early Post-acute Rehabilitation Facilities (Stier-Jarmer et al., 2005).

The ICF is of interest to health professionals working in rehabilitation as the categories describe functioning. As such the ICF may benefit rehabilitation practice by providing a common language to describe patient functioning, across all areas of health care (Üstün et al., 2003). Further to this, Gerold Stucki et al. (2003) claimed the ICF language would be used in “multi-professional patient assessment, goal setting, intervention management and evaluation” (p. 937). A systematic review evaluating how the ICF was being used in clinical rehabilitation supported these claims finding it improved information sharing, the development of team goals, documentation, clinical reasoning, and team communication. Better communication resulted in improved team satisfaction, team work and perceived quality of care (Wiegand, Belting, Fekete, Gutenbrunner, & Reinhardt, 2012). It was first highlighted by Stucki et al. (2003) that the interactive model of the ICF and the inclusion of the environment and personal factors would encourage rehabilitation professionals to consider these factors and their interactions when collecting patient data and planning treatment. Since this time it has been demonstrated that the ICF can help students and clinicians with clinical reasoning (Atkinson & Nixon-Cave, 2011; Furze et al., 2013). Mapping patient information to the

ICF and being aware of the possible interactions enables the clinician to understand the problems that are most important to the patient's participation, the resources and barriers, the factors that may affect further progress and the possible areas upon which the health professional may have most influence (Atkinson & Nixon-Cave, 2011). Using the ICF benefits health research as it enables the collection of consistent and comparable information on functioning (Üstün et al., 2003). As a result it may be possible to compare patient functioning, and health outcomes across countries, services, disciplines and over time (World Health Organization, 2001). As the ICF is more widely used it will enable the development of patient norms for the functional impact of a specific condition, and this may inform the need for future rehabilitation services (Üstün et al., 2003).

Although it was predicted by Stucki et al. (2003) that the ICF will be used for quality assurance, and benchmarking of health services, little has been written about this topic. Only one study to date has used the ICF as an audit tool (Tantilipikorn, Watter, & Prasertsukdee, 2012). This study linked the assessment and intervention data of 269 children with cerebral palsy to the ICF-Child and Youth version (ICF-CY). The researchers found that compared to international data, there were lower numbers of interventions for gastrointestinal problems, hearing impairment, visual defects and cognitive problems. In addition, the most frequent interventions for physiotherapy, speech therapy and occupational therapy were in the body impairment categories, rather than the activities and participation categories (Tantilipikorn et al., 2012). The authors concluded that using the ICF-CY framework to categorise patient information could identify inadequate assessment measures and gaps in the management of the patients' rehabilitation.

1.2 Rationale and Introduction to the Present Study

In order to fulfil its promise in the rehabilitation field, the ICF needs to be a valid tool that represents the functional concerns of patients and the wording of the ICF must promote consistent use of the ICF categories. Consequently, the specific objectives of this observational retrospective study are to:

- A) Compare the interventions coded against the ICF and EICSS to identify if any clinically important interventions are not represented by either the ICF or EICSS.
- B) Determine whether coding interventions to the ICF can generate clinically useful feedback to the team in relation to addressing the full range of patient concerns and the rehabilitation needs of Māori and non-Māori.

1.3 Context of the Study

The study is situated in Auckland, New Zealand, a city of 1.42 million people (Statistics New Zealand, 2013). Of this population, 56.5 % identify as Europeans, 18.9% as Asian, 14.4% as Pacific peoples, and 11.1% as Māori (Statistics New Zealand, 2006).

The NZ Health Survey Update of Key Findings (2012/2013) found that between July 2012 and June 2013, 70,000 adults reported having had a stroke. Of this group one in ten adults was older than 75 years and Māori were 1.4 times more likely to have a stroke than non-Māori (Ministry of Health, 2013). In 2009 cerebrovascular disease was the third leading cause of death in NZ, with 2488 deaths from stroke. Of these, Māori had a higher proportion of deaths under 65 years than non-Māori (Ministry of Health, 2012b). The younger age onset for stroke for Māori was also reported by McNaughton et al. (2011), who found the average age for first time stroke in Europeans was 76.3 years while for Māori it was 61.7 years. Stroke causes high levels of disability, and

whilst it has been estimated that in New Zealand 30% of stroke survivors recover fully after 5 years, 50% are left with mild to moderate disability and 20% are left with severe disability (Tobias, Cheung, Carter, Anderson, & Feigin, 2007). In NZ, stroke rehabilitation is publicly funded from taxation and the NZ government allocates this money to 20 district health boards (DHBs). The role of the DHB is to use the government funding to plan, purchase and provide health services for a specified geographical region. To achieve consistency and equity across New Zealand each DHB must provide mandatory services outlined in the Nationwide Service Framework. Under this framework DHBs are required to provide “Community Health, Transitional and Support Services” for people over 65 years. Community Health is defined as non-inpatient allied health services, specialist nursing (oxygen and stoma therapy), palliative care and specialist older people’s service. Transitional support services are for people who have recently been discharged from hospital who need rehabilitation to improve their health and regain independence. Both these services provide rehabilitation at home by an allied health multidisciplinary team. Support services provide information, needs assessment, personal and domestic support and respite care (Ministry of Health, 2012a). Although community rehabilitation is considered mandatory there are still many DHBs that do not provide this service. This was recently highlighted in a newspaper article by Fletcher (2013) stating that people with stroke in the Mid-central DHB do not have access to outpatient or community based rehabilitation. Publically funded community stroke rehabilitation is rare and only Auckland, Counties Manukau and Capital Coast DHBs provide a dedicated community rehabilitation team for people with stroke. This is in contrast to what is recommended by the Stroke Foundation of New Zealand and New Zealand Guidelines Group (2010). This publication recommends that in DHBs serving over 200,000 people, there should be a community stroke rehabilitation service, and

smaller DHBs should either have a designated stroke rehabilitation area in the hospital or an interdisciplinary team within the hospital that focuses on patients requiring stroke rehabilitation.

The community rehabilitation service discussed in this thesis was set up as a “Stroke and Specialist Rehabilitation” team, and its role is to provide rehabilitation in people’s home to patients over 65 years with stroke and frail elderly who need continuing rehabilitation. Patients are referred from the hospital’s rehabilitation wards, the stroke unit, or general medical wards and by general practitioners in the community. The service is staffed by two full time occupational therapists, 2.2 full time physiotherapists, and a nurse for 0.7 hours a week. Within the community rehabilitation service there is another team called the “Community Allied Health Team” that provides rehabilitation to people of all ages and conditions. The Stroke and Specialist Rehabilitation stream can access the following staff from this service when needed: one full time speech therapist, one full time dietician, one social worker and 10 therapy assistants. A psychologist can be accessed from another community health service in a different location, and a geriatrician from the local hospital. Patients are eligible for three months of rehabilitation, and for patients who would benefit from extra therapy, rehabilitation can be extended for a further 3 months. There is a service manager who arranges a meeting once a week with all staff to discuss new referrals and patient progress, and assigns a key worker to each patient. The key worker carries out the initial interdisciplinary assessment and goal setting with the patient, and arranges regular patient progress meetings. All patients have their own electronic file and all patient notes and assessment information are recorded and kept in this file. On discharge the patient and their general practitioner receive an interdisciplinary discharge letter, outlining the patient’s concerns on admission, patient progress, current status and plan for discharge. All patients are

assessed on admission and discharge using the Barthel Index (BI) and the Nottingham Extended Activities of Daily Living (NEADL). The BI has two items that measure level of dependence for two body function areas (bowel and bladder continence) and eight items related to activities (grooming, feeding, transfer, toilet use, walking, stairs and bathing) (Collin, Wade, Davies, & Horne, 1988). The NEADL has 22 items, of which 16 measure activities and 6 measure social participation (using public transport, shopping, managing money, going out socially, managing the garden and driving a car) (Green, Forster, & Young, 2001). The BI and an outcome measure that is the same or similar to the NEADL were also used in four studies which evaluated the effectiveness of multidisciplinary community rehabilitation for patients with stroke. (Björkdahl, Lundgren Nilsoon, Grimby, & Sunnerhagen, 2006; J. Gladman & Lincoln, 1994; J. Gladman, Lincoln, & Barer, 1993; Lincoln, Walker, Dixon, & Knights, 2004). This evidence of professional acceptance of the BI and the NEADL as valid measures of stroke rehabilitation suggests that the team involved in the present study rehabilitation is aiming to achieve the outcomes identified on those assessments.

1.4 Overview of the Thesis

The thesis is organised in the following way:

Chapter 2 will discuss and critique the research that contributed to the development of the EICSS. The first section will focus on the preliminary studies and consensus conference that resulted in the Comprehensive Core Set for Stroke. Following this the preliminary studies and consensus conference for the Neurological Acute and Post-Acute Rehabilitation Core Sets will be reviewed and the last section will review the health professional and patient validation studies of the EICSS.

Chapter 3 will describe the methods that were used in this observational retrospective review of patient records. The first section will discuss the ethical processes that were followed, the eligibility criteria for patient records to be included in this study and the methodology. The second section will outline the reliability processes used to extract and link the interventions to the EICSS codes. Specifically, this section will outline the linking rules developed by Cieza et al. (2005) and the coding guideline that was used to improve consistency of coding decisions. The last section will discuss how the data were analysed.

Chapter 4 will present the results of the study. The first section will summarise the key findings and present the demographic data for the Māori and non-Māori patients whose records were analysed in this study. Following this, the frequencies of interventions for each category in the EICSS are presented under the headings: Body Function and Structure, Activities and Participation and the Environment. The next section condenses the data to show general trends. This is done by linking the total frequency of codes to 26 headings which encompass all the categories for Body function and Structure, Activities and Participation and the Environment. This method is used to analyse the frequency of interventions provided by each health professional and to compare the interventions for Māori and non-Māori.

Chapter 5 presents an interpretation of the study findings and their implications. The first two sections will compare the findings on the EICSS and the community stroke team's service provision to previous research. The third section will outline the strengths and limitations of the study. The fourth section will draw out the implications of the findings for the EICSS, the community stroke rehabilitation team, the use of the

EICSS in NZ and the implications for future policy development. The last section will provide recommendations for future research and a conclusion.

Chapter 2. Literature Review

In order to establish the need for this study, the literature review will critically discuss the research that has contributed to the development of the Extended ICF Core Set for Stroke. The EICSS is made up of three core sets. The first was the Comprehensive ICF Core Set for Stroke; later extra categories were added from the ICF Core Set for Patients with Neurological Conditions in Acute Hospital (ICSNA), and the ICF Core Set for Patients with Neurological Conditions in Post-Acute Facilities (ICSNPA). The literature review will start by discussing the preliminary research and the consensus conferences that contributed to the development of the Comprehensive ICF Core Set for Stroke and the ICF Core Sets for Patients with Neurological Conditions in Acute and Post-acute Facilities. The second part of the review will discuss the validation studies for the EICSS, the ICSNA and the ICSNPA, from the perspective of health professionals and patients. This review will identify gaps in the research and use this knowledge to inform the research questions and methods used in this thesis.

2.1 Search Strategy

The researcher carried out the literature search using the EPSCO health data base as it includes academic literature from nursing, allied health, medicine and psychology. The SCOPUS data base was also used as 32% of the content relates to health sciences. Articles were included if they were written between 1990 and 2012, and the abstract content related to the development or validity of the Extended ICF Core Set for Stroke, the Comprehensive ICF Core Set for Stroke or the Acute and Post-Acute ICF Core Set for Neurological Conditions. Articles were excluded if they were duplicates, discussed the reliability of the ICF, were not linked to stroke, and were applying the ICF in a rehabilitation settings. The results of the literature search are in Table 1.

Table 1. Search terms used for literature search on the Extended ICF Core Set for Stroke (EICSS).

Search terms	Data base	No. of articles	Relevant articles
Extended ICF core set for stroke	EBSCO	23	8
OR ICF acute and post neurological core sets			
OR Comprehensive ICF Core Set for Stroke	Scopus	64	4
AND development AND validity			
NOT brief ICF core sets			
Total articles		87	12

2.2 Development of the ICF Core Sets

In its original form the ICF classification system has 1,454 categories. Consequently, concern has been expressed that the ICF is not a practical or feasible tool to use in clinical settings (G. Stucki, Ewert, & Cieza, 2002). A practical solution advocated by G. Stucki, Ewert, et al. (2002) was to develop core sets for specific conditions and for specific health services.

To pursue this aim, the ICF Core Set project was set up in 2001 as a collaborative project between the ICF Research Branch of the Collaboration Centre of the Family of International Classifications (DIMDI) at the Ludwig-Maximilian University in Munich, and the Classification, Assessment and Survey (CAS) team at the WHO. The goal of this project was to “select sets of categories out of the whole classification, which can serve as minimal standards for assessment and reporting of function and health for clinical studies, clinical encounters and for multi-professional comprehensive assessment” (G. Stucki, Cieza, et al., 2002, p. 281). The ICF Core Set project team saw the need for two types of core sets. The Brief ICF Core Set was for a specific condition and had the least number of categories possible but enough categories to describe the typical impact of that condition. This type of core set was designed as a minimum data set to describe the impact of the condition, enabling meaningful comparisons of studies

that used participants with the same condition. The Comprehensive ICF Core Sets were designed to guide multidisciplinary assessment of people with a specific condition. They would have the least number of categories to be practicable but enough categories to describe the typical range of problems experienced by a person with this condition (Cieza et al., 2004).

The development plan for the first ICF core sets was outlined by G. Stucki, Cieza, et al. (2002). Phase one of the process aimed to select core set domains for stroke and 11 other chronic conditions. This was done by collecting data from preliminary studies and presenting this information at three international conferences. At these conferences international experts used the preliminary studies and the Delphi process, a consensus method to select the most widely used domains for each condition. Phase two of the project would research each core set for its feasibility, reliability, validity and sensitivity (G. Stucki, Cieza, et al., 2002).

2.2.1 The preliminary studies contributing to the development of the Comprehensive and Brief ICF Core Sets for Stroke

As the outcomes of the preliminary studies were a key step in the development of the first 12 brief and comprehensive core sets, the following section will present a critical review of the preliminary studies that supported the decision making on the brief and comprehensive core set for stroke. The first study identified the most common health related problems across 12 chronic conditions by interviewing 917 people using the ICF checklist (Ewert et al., 2004). Of the 917 participants, 801 were inpatients in a rehabilitation facility and 116 were out-patients. Out of the total group, 93 participants had a stroke. For each condition, the research generated a list of the most common patient problems in the areas of body function and structure, activities and participation and the environment. There are several criticisms of this research. The participants were

predominantly inpatients, so it can be assumed that the health related problems that were identified were those present in the post- acute rather than chronic stage when people are living at home. Additionally, it is not known how many participants had a moderate or severe stroke, which would have affected the type and magnitude of problems they were experiencing. The interviewing tool used in this study was the ICF check list, which has 125 categories from the original ICF, and did not attempt to identify problems unique to specific diagnoses (Ewert et al., 2004). The patients' co-morbidities were not systematically reported, consequently the problems identified by the ICF checklist could be from another condition and not from the chronic condition, which was the focus of the research. Further to these limitations, the participants were all living in Germany, so the research results cannot be generalised to other countries, particularly in the environment section, because a country's health policies, geography, culture and climate can change a person's experience of the condition (Ewert et al., 2004). The assertion that the environment effects health is supported by Weinrich and Stuart (2011) who found there were different admission criteria for rehabilitation services within the European Union. For example, in Germany, Switzerland and Belgium premorbid disabilities are included in the criteria for inpatient rehabilitation but this is not the case in the United Kingdom. Weinrich and Stuart cited a survey which found that 57% of Italians, 53% Norwegians, 23% Swiss, and 44% of British physicians perceived there was a scarcity of rehabilitation services for people with stroke. Access to rehabilitation in the United States is determined by geographical location and access to medical insurance. In some parts of the world, such as sub-Saharan Africa and Ghana, there are no rehabilitation services available (Weinrich & Stuart, 2011). The level of environmental support will effect a patient's ability to regain the functional abilities that have been effected by stroke.

The second preliminary study quantified concepts used in stroke outcome measures and linked them to the ICF (Geyh, Kurt, et al., 2004). Research studies using standardised stroke outcome measures were identified from 1992 to 2001, and 160 studies were randomly selected for further analysis. In this group, 148 standardised stroke outcome measures were identified, and 11,283 concepts were extracted and linked to the ICF. This process found that 91% of the concepts could be linked to the ICF categories, 6% of the concepts were not specific enough to be linked and 3% were not represented in the ICF. The researchers concluded that ICF categories that were linked most frequently to outcome measure concepts were the most relevant stroke outcomes from a research perspective. The logic behind this conclusion can be questioned as the frequency with which an ICF category was mentioned is dependent on the spread and type of outcome measures that were used in the study. From reviewing the list of the 20 most frequently used outcome measures, 15 measured impairment, two measured basic functional activities, two measured instrumental activities of daily living and one measured the severity of a stroke. Consequently, this study has a bias to reporting the frequency of the ICF categories in the impairment focused outcome measures, and the results may have been quite different if more activities, participation, and environment outcome measures were being used. The design of the study could have been improved by randomly selecting measures and then placing them in the general component categories of the ICF. After this step, an even number of measures could have been randomly selected from each category. As a result of this study, the list of the most frequent 83 ICF categories linked to outcome measures were used to assist experts in the consensus conferences to decide which ICF categories should be included in the Comprehensive Core Set for Stroke, thus potentially accentuating the bias towards body structure and function.

The objective of the third preliminary study was to identify the most typical and relevant ICF categories for 12 chronic conditions from the perspective of health professionals (Weigl et al., 2004). Using the Delphi technique, experts for each condition were surveyed three times. In the first round, the question was open ended and respondents were asked to list the relevant or typical issues under the headings body function, body structures, activities and participation and environmental factors. Data generated from this exercise were then linked to the ICF categories. In the second and third rounds, the experts were shown a summary list of the most frequent categories that had been selected in the previous rounds and information on their previous personal choices. In both the second and third round experts were asked to indicate if each category was relevant or typical for a specific condition. In relation to stroke, there were 74 ICF categories that had an 80% consensus in the third round. For the stroke condition there were approximately 108 invited experts but only 43 participated in the study. Of the invited professions, 64 were physicians, 23 occupational therapists or physiotherapists, two nurses, two psychologists and nine other professions such as social workers, and public health specialists. The article does not identify professions of the 43 people who participated, but the higher number of invitations to the medical profession may have influenced the type of categories that gained an 80% consensus rate. This could be the underlying reason why the categories; *d640 doing housework*, *d845 acquiring, keeping and terminating a job*, *e140 products for culture and technology for sport, leisure and recreation*, and *e584 education and training services, systems and policies*, did not reach the 80% consensus rate. Of the approximate 108 invited experts there were 79 from Western Europe, five from Eastern Europe, five from North America, five from Asia and seven from Australia. No experts were represented from Africa or South America. The numerical dominance of experts from western

cultures may have resulted in categories that represented western cultural values. The larger impact of western cultures is evident, as all four Asian experts for the Diabetes Mellitus condition rated the following categories as important: *e320 friends*, *e420 individual attitudes of friends* and *e555 associations and organisation services, systems and policies*, compared to only 64% of the Western European experts. The researchers acknowledged that unequal distribution of experts from different health disciplines and the greater bias to western cultures has limited the reliability and generalizability of these results (Weigl et al., 2004).

The identified ICF categories and the results of the preliminary studies were used as the starting point to decide on the brief and comprehensive core set for 12 chronic conditions at the consensus conferences held in 2002 and 2003.

2.2.2 Consensus conference to develop the Comprehensive and Brief ICF Core Set for Stroke

At the consensus conference, stroke was one of the 12 chronic conditions for which a brief and comprehensive core set were developed. Participants invited to the conference came from 12 different countries and were considered experts in the field of functioning and health, quality of life, health statistics and public health (Cieza et al., 2004). Prior to the consensus process, participants were given a half-day training on the ICF, and a summary list of the ICF categories generated from the preliminary studies. The decision making process consisted of repeated voting, feedback, and discussion, until a consensus of opinion was reached on the categories to be included or excluded (Cieza et al., 2004). In contrast to later consensus conferences, the details of the voting procedures were not reported. At the consensus conference for stroke, 130 second level ICF categories were chosen for the Comprehensive ICF Core Set for Stroke and 18 second level categories were chosen for the Brief ICF Core Set for Stroke (Geyh, Cieza,

et al., 2004). Although the consensus conference appeared to have sound processes, there were some limitations that affected the validity of the results. Of the 36 experts, 25 were doctors, seven physical therapists, two psychologists, one social worker and one sociologist (Geyh, Cieza, et al., 2004). The higher proportion of medical professionals may have influenced the type of categories that were chosen. In an effort to capture the most relevant categories and to ensure the list was a manageable size, the group of experts developed some decision making guidelines, which were used for the more controversial categories. If a concept was described in both the body function and activities and participation components, it was decided to use only one category. For example, the activity of *d110 watching* was removed as it was considered to have been captured by the body function concept of *b210 seeing*. Although this reduction seems logical, these two concepts have quite different meanings; “watching” implies involvement in an activity, whereas “seeing” is a function of the eye structures. The need to limit categories also resulted in a decision to prioritise categories that had the highest level of burden to the patient. For example, the category of *d760 family relationships* was chosen over *d730 relating to strangers*. Although the experts were doing their best to represent the patient perspective, it is unclear if these choices actually reflect the view point of patients, who were not part of the conference. These limitations were recognised at the time and it was recommended that the first version of the ICF Comprehensive Core Set for Stroke be validated by different professions, in different settings and countries (Geyh, Cieza, et al., 2004). Since its development, the Comprehensive ICF Core Set for Stroke it has been validated for use by physicians (Lemberg, Kirchberger, Stucki, & Cieza, 2010), occupational therapists (Glässel et al., 2010), and patients in Sweden at six weeks and three months after stroke (Algurén, Lundgren-Nilsson, & Sunnerhagen, 2010; 2009).

From this review of the development of the Comprehensive ICF Core Set for Stroke, and the preliminary studies, it appears that several factors may have created a bias for inclusion of the impairment health states. This may have occurred as there was a greater representation of medical professionals compared to allied health staff, the patients' perspective was gained from acute and post-acute care rather than patients living in the community, and the researcher's perspective was based on concepts predominately taken from impairment focused measures. As a result, the Comprehensive ICF Core Set for Stroke may not represent the range of functional problems experienced by people with stroke living in the community.

2.3 The Extended ICF Core Set for Stroke

Starrost et al. (2008) were the first in the literature to combine the three core sets related to stroke and named them the Extended ICF Core Set for Stroke. In the opinion of Glässel, Coenen, Kollerits, and Cieza (2012), the EICSS can be used in all clinical situations as “it presents a broad condition specific perspective that reflects the whole health experience of persons suffering from the effects of stroke” (p. 158). The EICSS contains 130 categories selected for the ICF Comprehensive ICF Core Set for Stroke, and 36 categories from the ICF Core Set for Patients with Neurological Conditions in Acute Hospital, and the ICF Core Set for Patients with Neurological Conditions in Early Post-acute Rehabilitation Facilities (Cieza et al., 2004; Ewert et al., 2005; Stier-Jarmer et al., 2005). Of the 166 EICSS second level categories, 59 (35.5%) relate to body function, 11 (6.6%) to body structure, 59 (35.5%) to activities and participation and 37 (22.3%) to environment. The next section will evaluate the preliminary studies and the consensus conferences that contributed to the development of the ICF acute and post-acute neurological core sets.

2.3.1 Acute and post-acute ICF core sets for patients with neurological conditions

The process for developing these core sets was very similar to the first core sets developed for chronic conditions. There were preliminary studies, which aimed to identify the most relevant categories from the perspective of the patient, the health professional and the researcher. The results informed experts who attended a consensus conference in 2003, to decide the categories for the ICF core sets for acute and post-acute neurological conditions.

In the first preliminary study, health professionals who had treated people with neurological, cardiopulmonary and musculoskeletal conditions in the acute stage of care were asked to determine the most relevant ICF categories for these conditions (Grill, Quittan, Huber, Boldt, & Stucki, 2005). The group consensus was that there were 164 relevant ICF categories in the acute stage of care for neurological conditions. Only 14 health professionals (from Munich, Zurich, and Vienna) were asked to consider the ICF categories for neurological conditions, which may have been too small to represent the practice of health professions that work in this area. It was also apparent that some of the ICF definitions of terms were unclear or ambiguous as it was reported that participants had difficulty distinguishing between the terms global psychosocial function and intellectual function (Grill, Quittan, et al., 2005). The strengths of this study were that the views of a nurse, physician, physiotherapist, occupational therapist, speech therapist, psychologist and neuropsychologist were represented in each of the three focus groups. Consequently, this range of disciplines may have brought a more comprehensive understanding of the functional problems of neurological patients than the preliminary study by Weigl et al. (2004) that gained the health professional perspective for the Comprehensive ICF Core set for Stroke.

Three preliminary studies investigated the patient viewpoint on functional problems in the acute and post-acute stages of neurological rehabilitation using ICF categories (Grill, Huber, et al., 2005). The first study focused on the acute stages of care, and was a cross-sectional study of 101 participants in three hospitals in Munich, Zurich and Vienna. Participants were interviewed using a list of 164 ICF categories. This list had been identified by health professionals as key categories for acute neurological conditions (Grill, Huber, et al., 2005; Grill, Lipp, Boldt, Stucki, & Koenig, 2005; Grill, Stucki, Boldt, Joisten, & Swoboda, 2005). Interviewers were instructed to ask patients about their functioning in these areas and when clients could not answer, to talk to the staff and family and to review patient records. Patients identified 115 ICF categories that were relevant for this stage of care. Although a reasonably large group of participants was included, only between 40 to 50% of patients in the participating hospitals were able to respond to the questions on their own. It appears that for over half of the participants, information was gained from staff, family or from patient notes. This method of gaining information may have been influenced by the interviewer's interpretation of the notes, and consequently open to bias. However, this method did ensure the functional problems of very ill patients were represented in the data.

The post-acute patient perspective study was also a cross-sectional study in which information was gathered from the patient, and if this was not possible from hospital staff, relatives and patients notes (Grill, Lipp, et al., 2005). There were 292 participants from two hospitals in Germany that specialised in neurological rehabilitation. Interviewers were not given a prescribed set of categories to guide questioning but were expected to cover all second level categories in the ICF. The researchers found there were 125 ICF categories that reflected patient problems in the post-acute stage of neurological rehabilitation. It is interesting to note that 80% of patients were not able to

respond to the interviewer's questions in this study and most of the information was gained from family, staff and patient records. This seems unusual as this figure is more than the 40-50% of patients who were not able to respond in the acute care setting (Grill, Huber, et al., 2005). Patients in the post-acute stage of rehabilitation are more medically stable and more able to respond to questions than acute patients, therefore these results may reflect the views of interviewer and not the views of the patients. The researchers acknowledge that interviewer bias may have occurred, as low numbers of patients reported restrictions with interpersonal relationships (37.3%) and community life (44.6%), despite the possible negative effects of being in hospital on social relationships and community activities. In both studies the mean age of participants was relatively young (57.6 years and 56.6 years), compared to the average for stroke in NZ which is 76.3 years (McNaughton et al., 2011).

The third study on the patient perspective focused on 150 geriatric patients who were receiving post-acute rehabilitation in one hospital in Germany (Grill, Stucki et al., 2005). This study had a similar design to the previous study on post-acute patients except the mean age of the participants was 79.9 years, and only 30.7 % of the participants had a cardiovascular condition. The remainder were receiving rehabilitation for injuries, coronary heart disease or arthropathies. In contrast to the previous study, 82 categories were found relevant to patients receiving post-acute rehabilitation compared to the 125 categories identified by Grill, Lipp, et al. (2005). It is possible that the Grill, Stucki et al. (2005) result is more accurate, as 80% of patients in this study were able to participate in the interview. However, all the studies recruited participants from a similar region in Europe and consequently the findings cannot be generalised to patients in the acute and post-acute stages of care in other countries. In addition, neither study reported processes to improve the inter-rater reliability of the interviewers.

To gain an understanding of the ICF categories important to researchers, one preliminary study aimed to determine the ICF concepts used in research outcome measures in acute hospital and early post-acute rehabilitation (Scheuringer et al., 2005). In total, 259 standard assessment measures and 277 single clinical measures that met the inclusion criteria were identified. From this group 1,353 concepts were extracted and 96% of these concepts could be linked to 56 ICF categories. Only 5% of the measurement concepts could be linked to the ICF environment categories. It appears that even though social networks and family relationships are considered important, they are infrequently measured by outcome measures (Scheuringer et al., 2005). A key strength of the study was the inclusion of a large range of standardised and single clinical assessment tools. For example, the formal standardised assessments included diagnosis specific assessments, and assessments for pain, activities of daily living, cognition, emotional health, skin, and mobility. The methodology ensured inter-rater reliability by having two reviewers who separately extracted and linked concepts to the ICF. Disparities between the reviewers were resolved after discussion with a third reviewer.

2.3.2 The consensus conference to decide on the acute and post-acute ICF core sets for neurological conditions

The consensus conference to decide on ICF categories for acute and post-acute core sets for neurological, musculoskeletal and cardiopulmonary conditions was held in 2003 (Grill, Ewert, Chatterji, Kostanjsek, & Stucki, 2005). All the core sets developed at the conference had similar processes and voting procedures. Health professions were given the results of the preliminary studies as a starting point to make decisions. Health professionals in the same discipline were placed in small working parties and asked to discuss and then vote three times on the most relevant ICF categories for patients with

neurological conditions in both acute and post-acute rehabilitation. For the acute core set for neurological conditions, decisions were made by a total group of 21 health professionals, which included: five nurses, six physiotherapists, two occupational therapists and eight physicians. In the post-acute core sets, decisions were made by 17 health professionals: four nurses, five physiotherapists, two occupational therapists and 6 physicians (Stier-Jarmer et al., 2005). From this process it was decided that 85 ICF categories would be included in the core set for patients with neurological condition in the acute hospital (Ewert et al., 2005). The core set included the environmental factors of light and sound, which may affect patient care during the acute stage of care (Ewert et al., 2005). The post-acute core set for patients with neurological conditions consisted of 116 categories; the additional categories were in the activities and participation domain and reflected the increasing complexity of functional problems at this stage of recovery (Stier-Jarmer et al., 2005).

There are several aspects of the consensus process that may have affected the validity and reliability of the results for the acute and post-acute core sets for neurological conditions. The group of invited experts (17 for the acute, and 21 for the post-acute), were from German speaking countries, who based their decisions on their experience of patients in the health services where they work, and their cultural values. This small group cannot represent the views of all health professionals and the differing health systems and cultures where the ICF core sets will be applied. Although there was a greater attempt in this consensus conference to have a fair distribution of different health professions in the working groups, the groups still had uneven numbers which may have resulted in bias due to the small number of experts invited to the conference. Additionally no definitions were provided to the conference participants on the meaning of acute, early post-acute care which reportedly resulted in participants not being sure

whether a category should apply in the acute or the post-acute stages of rehabilitation (Stier-Jarmer et al., 2005). The lack of definitions also gives no guidance to users on when each core set should be selected.

In summary, this section examined the development of the acute and post-acute neurological core sets as the 36 categories from these core sets were added to the EICSS. These extra categories may not represent the functional problems of people with stroke that live in the community as the preliminary data was gathered from patients in the acute and early post-acute stages of neurological rehabilitation. In addition, the validity of the categories in the acute and post-acute core sets for neurological conditions may have been reduced by the following factors: only 14 experts from one region of Europe were used to represent the health professional perspective in the preliminary studies, the empirical data from acute and post-acute patients may not have fully represented the patients' view point, and the consensus conference was attended by a small number of experts who represented the German speaking countries in Europe. Therefore, without further testing, the acute and post-acute core sets cannot be seen as the valid concerns for the global population of people with stroke who are receiving acute and post-acute rehabilitation. In the development of the core sets there were no definitions for the terms neurological acute hospital care and early and late post-acute neurological rehabilitation, an omission that may affect the use of the core sets in practice.

2.4 Validation of the Extended ICF Core Set for Stroke from the Perspective of Health Professionals

There have been three research studies to date which have found that the EICSS demonstrates sufficient content validity from the perspective of physicians,

physiotherapists and occupational therapists (Glässel, Kirchberger, Kollerits, Amann, & Cieza, 2011; Glässel et al., 2010; Lemberg et al., 2010). The studies all used a three round electronic mail survey, using the Delphi technique, to obtain the consensus votes of health professionals who were experts in the field of stroke rehabilitation. There were 88 physicians from 30 countries, 125 physiotherapists from 24 countries, and 69 occupational therapists from 21 countries. All the health professionals were asked to “list the patient’s problems, patient’s resources and aspects of the environment treated by the health professional in patients with stroke” (Glässel et al., 2010, p. 291).

All the studies extracted meaningful concepts from the participants’ replies and then linked to the categories in the ICF and the EICSS. When concepts could not be linked they were attributed to personal factors or to areas that are not covered by the ICF. Before the second round of voting, participants were given a list of the linked ICF categories, and a frequency rating of each category. The second vote asked participants to vote for or against each category in relation to the treatment they provide to patients with stroke. For the third vote, responses and frequencies were again fed back to the participants, and a final vote was taken for each category. Only categories that were voted 75% or over were regarded as the consensus view of the profession.

All professions voted for some treatment areas that were present in the ICF but were not in the second level categories in the ECISS. For physicians there were four areas, physiotherapists eight areas and occupational therapists 14 areas. All professions considered the category *b765 involuntary movement* relevant for their discipline (Glässel et al., 2011; Glässel et al., 2010; Lemberg et al., 2010). Combining all the results of the three studies, there were seven categories for which two professions considered the same categories important treatment areas for stroke. These categories

are listed below and a comparison of findings from these studies is in appendix C: *b720 mobility of bone functions, b780 sensations related to muscles and movements, s760 structure of the trunk, s770 additional musculoskeletal structures, d435 moving objects with the lower extremity, d650 caring for household objects, and e140 products and technology for culture recreation and sport.*

All the studies identified areas of treatment not covered by the ICF or EICSS; the physicians identified four areas, physiotherapists 15 areas, and occupational therapists 26 areas. Many of these aspects refer to the processes that are inherent in the rehabilitation role of a health professional, such as multidisciplinary and interdisciplinary treatment, preventing secondary complications and follow-up (Glässer et al., 2011; Glässer et al., 2010; Lemberg et al., 2010). For three areas two professions identified the same categories as not being present in the ICF and EICSS; these were neglect, posture and patient education or knowledge of the condition (Glässer et al., 2011; Glässer et al., 2010; Lemberg et al., 2010).

The strengths of this research were that participants were asked an open question on the areas of treatment relevant to their profession rather than being provided with a predetermined list of ICF categories. Also, the method ensured a consensus of opinion as only responses rated over 75% were included for analysis. Most of the studies identified clearly the areas not in the EICSS or the ICF. The limitations were that the health professionals were mostly from western countries with poor representation from Africa and Asia so the research results cannot be generalised to all health professionals who work with patients with stroke. In two of the studies, the researchers identified categories in the third and fourth levels of the ICF, and made the point that this level of detail was needed for their profession (Glässer et al., 2011; Glässer et al., 2010).

Although this may be the case, the EICSS is comprised of second level categories and the third and fourth level categories are nested under these second level categories. It is assumed that if needed the user will use the more detailed third and fourth level categories under the second level categories.

2.4.1 Validation of the ICF core sets for acute and post-acute neurological conditions

This section will briefly evaluate the two validation studies (Müller, Grill, et al., 2011; Müller, Stier-Jarmer, et al., 2011). Both studies used a prospective multi-centre cohort design and data collection was completed between 2005 and 2008. The purpose of these studies was to assess if the categories of each core set corresponded to the functional problems of patients and to assess if each category could assess change over time (Müller, Grill, et al., 2011). In the acute core set study there were 91 participants with neurological conditions from four hospitals in Germany, Switzerland, and Austria. In the post-acute study there were 67 participants who came from post-acute rehabilitation facilities, two in Austria and seven in Germany. The researchers were asked to identify each patient's impairments, limitations and restrictions that were present in the relevant core set. Researchers were instructed to gather information from patients' files and interviews with patients and health professionals. To assess if there were missing areas in each core set, interviewers were instructed to record problems not found in the current core sets. Data were collected in the body function, and activities and participation areas on admission and discharge, and information on the environment was only collected on admission. Categories were considered valid when frequencies of response were 5% and over. Both studies confirmed the categories in each core set, but also found categories with high frequencies that were not in the acute or post-acute core set. As a result, the authors recommended that the categories *d450 walking* and *d455*

moving around, should be added to the acute neurological core set, and the category, *s540 structure of the intestines* should be added to the post-acute neurological core set. As the EICSS already has the categories *walking* and *moving around* from the Comprehensive ICF Core Set for Stroke the only category that should be considered for addition to the EICSS, is the category *s540 structure of the intestines*. Again, the two validation studies were carried out on participants who live in Germany, Austria and Switzerland, consequently the results cannot be generalised outside these regions.

2.4.2 Validation studies of the EICSS from the patient's perspective

Three studies have validated the EICSS from the patient perspective. Algurén et al. (2010) interviewed 90 people with stroke living in Sweden, with an average age of 72 years, using the body function and the activities and participation sections of the EICSS. A category was considered validated when 10% or more of the participants had the same functional problem at both 6 weeks and 3 months post stroke. Using this criterion, only 28 out of 59 body function categories and 41 out of 59 activities and participation categories were validated. The possible reasons for the non-validated body function categories were that participants were not in the acute stages of care and due to their age were not affected by impairments associated with advanced age such as hearing loss and conditions affecting the immunological and respiratory systems. The non-validated areas in the activities and participation categories could be due to participants not planning to return to paid employment. Other reasons for the non-validated categories could be that these categories represent less common functional problems. The categories considered to be uncommon were categories in the chapter 7. Interpersonal interactions and relationships. From these results the authors concluded that it may be possible to remove some of the categories of the EICSS so that it is a more practical tool

in the clinical setting (Algurén et al., 2010). A second study using a similar method, focussed on environmental components of the EICSS on patients post stroke in Sweden. Although the purpose of the study was to identify the most important environmental facilitators and barriers at 6 weeks and 3 months post stroke, its findings also contributed to the validity of the 37 environmental categories of the EICSS (Algurén et al., 2009). This study found that 11 environmental categories were important to 50% or more of the 67 participants at both time points. It could be concluded that these 11 categories are key environmental factors for patients with stroke in this society. The highest rating environmental categories were: *e110 products and substances for personal consumption*, *e310 immediate family*, *e315 extended family*, and *e570 social security systems, services and policies*. The results of both these studies have validity as information was collected from patients rather than relying on family, and health staff. However, using a single interviewer and not using a standardised interview form may have affected the reliability of the results, as the interviewer's role and background may have biased interpretation of the questions.

A third study used focus groups to interview 60 participants who were on average 3 months post-stroke (Glässel et al., 2012). During the focus group participants were asked six open ended questions that covered each domain of the ICF. Data were recorded and transcribed and meaningful concepts were linked to the EICSS. The results confirmed 127 of its 166 categories and identified 31 categories not in the EICSS but present in the ICF. Of the additional categories identified, 11 were for the environment, nine for activities and participation, seven body structures and four for body function. There was only one concept, "reaction time," that was not covered by either the ICF or the EICSS that was recommended for inclusion in future updates of the ICF. This study provided the patient perspective, but did not determine the importance

of each category. Therefore, it is not known if the 31 extra categories are of most concern to people with stroke and should be included in the EICSS. Again, as the studies sourced participants from either Germany (Glässer et al., 2012) or Sweden (Algurén et al., 2010; Algurén et al., 2009), the results cannot be generalised to the other countries.

Across the validation studies with health professionals and patients (Appendix C), there were seven additional categories considered important that were common for both patients and health professionals (Glässer et al., 2012; Glässer et al., 2011; Glässer et al., 2010; Lemberg et al., 2010). The common categories thought to be important were: *b765 involuntary movement functions*, *b780 sensations related to movement*, *s760 structures of the trunk*, *s770 additional musculoskeletal structures related to movement*, *d435 moving objects with lower extremities*, *d650 caring for household objects* and *d660 assisting others*. That these categories were identified by both patients and health professionals suggests they should be added to the EICSS.

It is more difficult to draw conclusions from these studies on the patient perspective as each used a different method to collect data. The acute and post-acute studies collected information from medical notes, and by interviewing the patient and staff, whereas Glässer et al. (2010) used focus groups. Additionally, the criteria for determining validity of the findings varied across the studies. Whilst Müller, Grill, et al. (2011) and Müller, Stier-Jarmer, et al. (2011) considered categories with a frequency over 5% to be validated, Algurén et al. (2010) considered categories validated if they had a frequency of 10% or more at 6 weeks and 3 months post stroke, and Algurén et al. (2009) only considered environmental categories with 50% or higher frequency at 6 weeks and 3 months. Glässer et al. (2010) considered categories valid if they were mentioned once,

and there was no frequency data to support inclusion of the extra categories they proposed. Accordingly, these extra categories may not represent the concerns of most people with stroke. More validation studies which use a similar research method are needed, and data on the frequencies of problem areas which are present or not covered by the ICF and EICSS should be reported.

2.5 Summary

The ICF core sets have the potential to encourage global holistic rehabilitation practice resulting in health professionals using assessments and interventions that address the full range of patient concerns. The ICF core sets may also assist services to evaluate if they are meeting patient needs. To carry out these functions, core sets must accurately represent the functional needs of a specific patient group. The EICSS consists of 166 categories from the ICF and is meant to represent the functional needs of a person with stroke in the acute, post-acute and community stages of rehabilitation. This review has shown that the process used to select categories for the comprehensive core set for stroke and the acute and post-acute core set had some limitations. Firstly, the EICSS may not represent the diverse cultures and environments in which the EICSS will be used. Secondly, the body function categories may be over represented. Lastly, the perspective of patients who live in the community may not be represented in the EICSS. There have been three validation studies of the EICSS, drawing on the perspective of doctors, physiotherapists and occupational therapists, which identified some areas that are not addressed in the EICSS. Of the two validation studies representing the patient perspective, one identified 31 areas that were not in the EICSS, but were in the ICF, and one area that was not in the ICF.

The current study will address some of the gaps identified in this review. As data will be extracted from patient notes generated by a community stroke rehabilitation team in New Zealand, the results will contribute to the previously reported health professional validation studies. Additionally, the study directly addresses the limitation of previously reported studies being concentrated in acute hospital settings and emanating from Europe. Additionally, the present study may reflect a more accurate picture of the health professional perspective as the data will be based on interventions that have been carried out, rather than health professionals' opinion of the role they would take.

Chapter 3. Methodology

The first section of this chapter will outline the ethical processes, the key qualities of descriptive methodology that guide the present study and the criteria for the inclusion of patient files. In order to learn from others and inform the study design a brief analysis of the methods used by three studies that have also linked interventions to the ICF will be presented. This will be followed by the linking rules used to guide the extraction of interventions from the patient notes and linking interventions to the ICF (Cieza et al., 2005). To improve reliability and enable this study to be reproduced by others, a coding guideline will be presented and the rationale given for two difficult coding decisions. The next section will describe how the ICF coded interventions were counted and the process used to determine if the interventions were represented by the ICF and the EICSS. Lastly an explanation will be given on how the data was analysed for overall trends, and the method used to determine the impairment level of the patients used in this study

3.1 Aims and Objectives

The study aimed to evaluate whether the Extended ICF Core Set for Stroke (EICSS) captured the interventions of a community stroke rehabilitation team situated in the largest city in New Zealand. Achieving that aim was intended to generate feedback for both the ongoing development of the ICF and EICSS and the health service. The objectives of the study were to:

- Compare the interventions coded against the ICF and EICSS to identify if any clinically important interventions are not represented by either the ICF or EICSS.

- Determine whether coding interventions to the ICF can generate clinically useful feedback to the team in relation to addressing the full range of patient concerns and the rehabilitation needs of Māori and non-Māori.

3.2 Methodology

The present study uses a retrospective descriptive/observational methodology. Descriptive research aims to find out information on naturally occurring behaviour of particular groups without changing the environment or providing an intervention (Office of Research Integrity, n.d.). It involves gathering data and organising the information into a standardised form. In this case, information on the type of interventions provided by health professionals to people with stroke living in the community is coded to the categories of the EICSS. Following this process the coded information is quantified and descriptive statistics are used to reduce the data to a manageable form (The Association of Educational Communications and Technology, 2001). This methodology was chosen as the aim of the research is to evaluate whether the EICSS can describe rehabilitation interventions that are occurring in practice. Retrospectively collecting data means that there is a lack of bias as the “object of interest was not the original reason for the data being collected” (Mann, 2003, p. 55). The results of descriptive observational research may feed into further experimental research, if the researcher identifies specific factors that are important to manipulate or change, and has an hypothesis for why a behaviour is occurring (Office of Research Integrity, n.d.; The Association of Educational Communications and Technology, 2001).

3.3 Ethics

This study retrospectively reviews patient records of individuals who had received community stroke rehabilitation from one district health board. Before accessing,

extracting and analysing the data, ethical approval was gained from the ethics committee of the district health board, the Ministry of Health's Northern X Regional Ethics Committee, and the Auckland University of Technology Ethics Committee (Appendix A). The approval was granted on the basis that an employee of the community rehabilitation service was contracted to select, anonymise and copy the patient records. The employee also collected information from the notes on the patients' age, gender, and ethnicity. As a consequence of these actions the research did not come under the scope of the Health Information Privacy Code 1994, and did not require the consent of the patients (Health Research Council, 2002). The anonymised records were in print format and were hand delivered to the researcher who analysed the data in a private office space. When not in use, the client records were kept in a locked filing cabinet. The researcher, and the assistant, signed a confidentiality agreement to ensure the content of the notes was not discussed or disseminated outside of the community stroke rehabilitation service or the immediate research team. Only the data generated from the analysis of the interventions and the ICF codes are used in the thesis and in any future dissemination of the research.

3.4 Eligibility Criteria

Records of patients who received treatment during the period November 2010 to November 2011 were eligible for inclusion into the study. The first 10 Māori and first 10 non-Māori files were selected for the study if the patient was over 65 years of age, had a cortical or subcortical stroke and was seen by two or more members of the community rehabilitation team. As this study only attempts to capture interventions specific to the stroke population, patient records were excluded if the patient had an additional medical condition, which may have led to interventions and ICF categories

that are not present on the EICSS. Data extraction and linking to the ICF codes was expected to take 3 hours for each file. Consequently, 20 patient records were to be analysed, to keep within the time resources of the researcher. The research outcomes were not intended to be generalised to other services but may be of interest to Māori, the community rehabilitation service concerned, the district health board, and other community stroke rehabilitation teams in New Zealand.

It was considered important to have equal numbers of records from Māori and non-Māori patients in this study to enact the principles of “equal explanatory power”. This concept means that the researcher collects “information on Māori health development to at least the same depth and breadth as that obtained for non-Māori health development” (Wellington School of Medicine and Health Science, 2002, p. 2). Using this principle, there are equal numbers of Māori and non-Māori participants, as opposed to having sample numbers that reflect the proportion of Māori and Non-Māori in the population. If this principle was not used, the results of the research would reflect the larger ethnic group, and not provide enough information to analyse the impact of the research for Māori. By comparing the health of the two ethnic groups, it becomes possible to explore the reasons why Māori compared to non-Māori have poorer health in relation to earlier appearance of illness during the life span, higher rates of co-morbidities, and more severe disability and health needs (Wellington School of Medicine and Health Science, 2002). After reviewing the selected patient files, one Māori patient file was excluded as the primary diagnosis was not stroke, and one non-Māori patient file was excluded as the patient did not receive community rehabilitation. The excluded files were not replaced, as the research assistant had finished her employment at the service. Consequently, there were nine Māori and nine non-Māori files in this research.

3.5 Linking Interventions to the ICF

To inform the methods in this study, a literature search was carried out to identify other studies that have linked interventions or patient problems to the ICF. A search of the Scopus database was conducted with the search terms: ICF, AND linking, AND intervention, AND patient records, OR charts OR nursing process. This search resulted in identification of three studies and the methods of each study will be reviewed in this section. The first study by Boldt et al. (2005) evaluated whether the ICF represented the goals of nursing interventions for patients receiving post-acute neurological rehabilitation. Nurses who had provided care to 290 patients transferred the interventions to a standardised case report form. Not using a third person to identify interventions may have increased the accuracy of data collection, as that removed the need to interpret the interventions from clinical notes. Alternatively, this method could have introduced bias as the nurses providing the interventions may have had a vested interest in the result. The use of a standardised report form enabled the collection of consistent data across the patient records, although it is not clear whether the case report form represented all the nursing inventions provided in neurological rehabilitation. Three research nurses then independently identified the aims of the each intervention and linked the interventions to the second level codes of the ICF using the linking rules developed by Cieza et al. (2002). Interventions for actual problems and routine monitoring were coded. Decisions on coding were made after discussion and consensus between the three coders. The author made the point that, to code accurately the coders needed a sound knowledge of nursing practice. It appears that robust processes were used, as three people with the same professional background were able to discuss these decisions in some depth (Boldt et al., 2005). Descriptive statistics were used to determine the frequency of each intervention. As the primary goal of this research was

to establish whether nursing interventions were covered by the ICF, interventions provided more than once to the same patient were not recorded (Boldt et al., 2005).

The second study evaluated whether the ICF could retrospectively identify functional problems from rehabilitation data for patients with Traumatic Brain Injury (TBI), and whether the ICF could detect change over time (Ptyushkin, Vidmar, Burger, & Marincek, 2010). One researcher reviewed 100 patient records and extracted information on functioning from assessment, discharge and progress reports, to a case report form. Following this, meaningful units of information were identified and linked to the second level codes in the ICF using the linking rules developed by Cieza et al. (2002, 2005). To record change over time the researcher coded the severity of a problem using the ICF numeric qualifier codes to indicate the extent of a problem or to indicate if the environment was a facilitator or barrier (Ptyushkin et al., 2010). No processes were described to show whether the assigned qualifier codes, the extracted problems and linked ICF codes were done in a consistent and reliable way.

The third study retrospectively evaluated the scope of rehabilitation provided to 269 Thai children with cerebral palsy against the ICF for Children and Youths (ICF-CY) (Tantilipikorn et al., 2012). One researcher audited patient files, and linked demographic information, assessments and interventions to the component and chapter level of the ICF-CY as opposed to second level categories. For activities and participation the components were separated out, so each concept was linked to either activities or participation. Assessments and interventions were often linked to more than one component of the ICF. For example, the intervention of family counselling was linked to participation: *interpersonal interactions and relationships* and the environment: *support and relationships*. Similar to Boldt et al.'s (2005) study,

interventions were only counted once and no qualifier data was recorded, as the results only gave the percentage of children who received the intervention and not the frequencies of each intervention. This was the first study to provide information on the most common interventions associated with each health professional. Limitations of the study were that only one researcher extracted and coded the information so it was not possible to check the consistency of coding, and poor documentation of the aims of the intervention in the patient notes, may have limited the precision of coding.

In the present study, a standardised report of interventions will not be used as this may inhibit the reporting of a novel or highly specific intervention (Boldt et al., 2005). Instead the researcher will identify the interventions from the notes and a selected group of interventions will be checked for accuracy by two supervisors and by the community rehabilitation team. As the research aim of this study is identify whether the EICSS can capture community stroke interventions, no qualifier codes will be used to indicate the extent of a problem or to indicate whether the environment is a facilitator or barrier. In order to generate clinically useful information for the team on their rehabilitation practice both the frequency of the intervention and the health professional providing the intervention will be recorded. Although this practice differs from the studies by Boldt et al. (2005) and Tantilipikorn et al. (2012), frequency information will provide a greater understanding of what interventions are important for the team and for the patient. As it is evident that the credibility of a study is improved when there are reliability processes in place, this study will discuss and report difficult coding decisions with two supervisors, gain feedback on the interpretation of interventions from the community rehabilitation team and use a coding guideline sheet to ensure coding is consistent across the 18 patient records.

From this review it is evident that, to date, no studies have linked the interventions of a community stroke rehabilitation team to the Extended ICF Core Set for Stroke and no studies have recorded the frequency of interventions per patient or compared the interventions provided to two different ethnic groups. As these components are included in this study, the research method will extend how the ICF can be used to describe and analyse interventions in rehabilitation.

3.6 Linking Rules

Standardised linking rules to link concepts from health status measures to the ICF were first developed in 2002 (Cieza et al., 2002). In 2005 these rules were updated and a specific rule for use with technical and clinical measures and interventions was introduced (Cieza et al., 2005). The linking rules allow the ICF to be used as a reference point from which the researcher and clinician can describe, compare and contrast various types of health information and have been widely used to link outcome measures to the ICF. A systematic review of articles found that between 2001 and 2008 found there were 58 studies using the 2002 or 2005 linking rules (Fayed, Cieza, & Bickenbach, 2011). The linking guidelines specify that before linking interventions to the ICF, the researcher must describe the intervention and then define the aim or target of the intervention (Cieza et al., 2005). The target of the intervention is the meaningful concept, which is then linked to the ICF. In the present study, some interventions had more than one aim, and where this was clear from the notes the intervention was linked to one or more ICF categories. For example, if the intervention aim was to improve strength and endurance, both these concepts were linked to the ICF.

There are eight rules that guide the linking process:

1. The researcher should have a good knowledge of the ICF conceptual framework and understand the meaning of the terms and definitions for each component of the ICF. In this research, before the linking process occurred, the researcher practised the linking exercises provided in the e-tool www.icf-research-branch.org/icf-training/icf-e-learning-tool.html.
2. The meaningful concepts should be linked to the most precise ICF category.
3. When specific information cannot be coded to the ICF but can be linked to a more general code, the information is coded and specific information is documented. Consequently, the code “other specified” is not used.
4. When the meaning of a concept is not clearly defined, it should be linked to a less specific second level code.
5. When there is not enough information to make a decision to link to an ICF code, the information is assigned as “nd”, (non-definable). When this information relates to general health, physical health or mental health, it is assigned as “nd-gh” (non-definable, general health), nd-ph, (non-definable, physical health) or “nd-mh” (non-definable, mental health).
6. Meaningful concepts related to personal factors should be coded “pf” (personal factor).
7. Meaningful concepts not covered in the ICF should be assigned “nc” (not covered).
8. Meaningful concepts that relate to a diagnosis or health condition should be assigned “hc” (health condition) (Cieza et al., 2005).

In regard to rule 6, this research did not code interventions linked to personal factors as the personal factor categories have not been officially developed by WHO. In contrast to other research in this area, activities and participation components were not separated out but were linked to the combined components of activities and participation. This follows the coding option described by WHO: “Use the same domains for both activities and participation with total overlap of domains” (World Health Organization, 2001, p. 236). The research aim was to identify whether the EICSS categories described interventions and not to measure the impact of a category, consequently the qualifiers were not used for body function and activities and participation, and environmental factors were not coded as a barrier or a facilitator.

3.7 Reliability

Cieza et al. (2005) recommended that when a research design uses two different linkers, inter-rater reliability statistics should be used to check agreement for defining the aim of the intervention and linking the intervention to the ICF. It appears from a systematic review of research using the linking rules between 2001 and 2008, that most researchers have followed this process (Fayed et al., 2011). The review found that 50% of the articles that used the original linking rules and 70% of the articles that used the revised linking rules reported reliability statistics (Fayed et al., 2011). However, the linking rules have not been systematically tested for their reliability across a range of researchers and areas (Cieza et al., 2005).

The reliability of the linking process can be reduced by a number of factors. The linking guidelines do not describe a process to establish what is a “meaningful concept” in a measurement tool or a clinical area (Xiong & Hartley, 2008). Having a superficial understanding of the meaningful concepts in a particular area could lead to under

reporting and incorrect linking of meaningful concepts to the ICF. To overcome this problem Xiong and Hartley (2008) recommended that researchers come to a consensus on how to apply the ICF to the clinical area before the linking process starts. Reliability of the linking process is also threatened when the text information is unclear and consequently difficult to link, when there is disagreement between linkers on what ICF category best represents the text, and when there is a lack of agreement on how much contextual information should influence the linking decision (Fayed et al., 2011). Following a systematic review of linking articles, Fayed et al. (2011) stated that although agreement statistics “are valuable indicators of linking consistency, the quality of linking cannot be interpreted solely from statistics” (p. 1948). To improve the quality of the linking process, Fayed et al. recommended that the different perspectives of the linkers should be shared and integrated to form a final decision. An example of such a process is when researchers independently link categories, meet to compare and discuss results, and resolve differences by consulting a third person.

In light of this information the present research used the following reliability strategies:

1. Extracting the aims of the intervention from patient notes was supported by the researcher’s past work experience as an occupational therapist in a rehabilitation unit for the elderly and as a community occupational therapist. Knowledge of stroke interventions and the various roles and functions of the health professionals assisted the researcher to accurately identify the aims of the community stroke team interventions.
2. Coding the interventions was done by underlining and numbering the interventions in the patient records. After the interventions for each patient

had been identified, the researcher transferred this information to a numbered Excel worksheet. Each worksheet was organised under the column headings:

- Patient file number intervention number
- Exact words identifying the intervention
- Inferred target or aim of the intervention
- Linked ICF code
- Health professional who provided the intervention
- Rationale for the choice of ICF category or questions, when the researcher was not sure of the coding category

3.7.1 Review of coding decisions

As the researcher was the only person coding the data, she sought feedback on coding decisions from the two supervisors and the staff of the community stroke team as the coding progressed. The two supervisors checked samples of the coded interventions and contributed to in-depth discussions on coding decisions. Following these discussions, the researcher developed a list of coding decisions that would help guide coding for the remaining patient files. Subsequently, all coded files were reviewed to check that they had been coded in line with decisions made at these meetings. To ensure the researcher's interpretation of an intervention aim was in line with the intention of the community rehabilitation team, the researcher also met with the rehabilitation team on two occasions. At these meetings the team was presented with samples of interventions that the researcher found difficult to link to an ICF component. Feedback from the team were incorporated into the coding guideline which is outlined in Table 2 below.

Table 2. Coding guidelines

Intervention	Code
1. When the aim of the intervention is not clear from notes	The closest code to the intent of the words
2. What is an intervention	Only interventions that have been carried out with the patient not referrals to other services
3. When there are multiple concepts in an intervention	The primary idea, for example “family to seek funding from tribe, re fixing front steps”, only code funding and steps
4. Learning a compensatory strategy	d1550 learning a strategy or skill
5. When wording refers to prompting a physical skill e.g. with prompt client able to control drift of arm	b7600 control of movement
6. Stretching exercises when tone is not mentioned	b7101 mobility of several joints
7. Interventions extending or grading up exercises or reviewing exercises	b7301 power of muscles of one limb or b1701 mobility of several joints
8. Upper limb exercise with visualisation	b7301 improving power of one limb
9. Gait re-education	b770 gait pattern functions
10. Visual scanning	b156 perceptual functioning and awareness of body and space
11. Education regarding knowledge about condition	b1644 insight
12. Giving information to address a particular problem	d175 problem solving
13. Positioning a person to reduce swelling	s7302 structure of the hand, code was chosen to reflect the intent of maintaining the range of movement in the hand
14. Providing information on a communication group	d330 speaking
15. Rolling in bed	d4100 lying down, getting into and out of lying position
16. Assistive equipment used when preparing meals	d6300 preparing simple meals and e1151 assistive products for personal use in daily living
17. Walking indoors	d4600 moving around within the home
18. Walking outdoors	d4602 moving around outside the home and other buildings
19. Walking up to one kilometre outside	d4500 walking for less than a kilometre outside
20. Getting into and out of seated position	d4103 sitting
21. Sliding transfers	d4200 moving from a sitting position on one seat to another seat on the same or a different level
22. Education given to family, or care giver so that they are able to provide better care to the client	d660 assisting others

Intervention	Code
23. Getting cold drink from tap	d430 lifting and carrying objects
24. Advice on regulations around driving after a stroke	d4750 driving and b1644 insight
25. Knowledge about social security benefit options	e5751 general social support systems
26. Applications for funding	e5801 health system and the specific code for equipment or alteration
27. Permission from Housing New Zealand	e5251 housing systems
28. Information about power of attorney	e5502 legal policy
29. Collecting and returning equipment to storage	e5800 health service

3.7.2 Difficult coding decisions

1. Insight versus learning skills: It was difficult to code the intervention of providing education when it was used to improve the patient's understanding of their condition, or to explain why an intervention was being used. It was decided to code patient education as *b1644 insight*, as the intent was to gain understanding that would help the patient adapt their behaviour, or expectations, or to understand the aim of therapy. Examples of interventions that were coded this way were "gave communication sheet on the right hemisphere", "discussed impact of cognitive changes and impact on function," and "discussed exercises which would prepare her for gardening". Although the *b1644 insight* code was used, it may not be the correct code for this concept as this code could have been designed to describe the cognitive function of insight that could be impaired after brain injury. There were instances where this code was used in relation to patients who lacked awareness due to cognitive changes (and where this was reported in the notes) but on most occasions the code was used for providing education to patients who were not cognitively impaired.

2. Walking short distances versus moving around in different locations: It was difficult to determine the difference in meaning for these two categories. The description for *d4500 walking short distances*, states this code covers walking for less than a kilometre both inside and outside the home, whereas the code *d4600 moving around within the home* is more specific and defines walking as “walking and moving around the home, within a room, between rooms, and around the whole residence or living area” (World Health Organization, 2001 p.145). The code *d4602 moving around outside the home and other buildings*, is defined as “walking and moving around close to or far from one’s home” (World Health Organization, 2001, p. 46). In order to provide more specific information the researcher decided to use the code *d4600* for walking within the home, *d4602* for walking around outside the home and *d4501* for walking long distances.

3.7.3 Method used to count the data

The ICF classification is a hierarchy of codes and descriptions that consists of several levels. The four components of the ICF, body function, body structure, activities and participation and the environment are broken up into broad chapter headings. Each chapter is broken down to second, third and four level categories that describe a concept of functioning in more detail. For example, under the activities and participation component, one chapter relates to self-care, and the second level categories that describe self-care are: washing oneself, caring for body parts, toileting, dressing, eating, drinking, and looking after one’s health. Each of the second level categories are broken down to third and fourth level categories. The third level

categories for ‘washing oneself’ are: washing body parts, washing whole body and drying oneself.

To answer the question “Does the EICSS capture the interventions of a community stroke rehabilitation team?” patient interventions were coded to the most specific ICF category. This process revealed the interventions which were not represented by the ICF. The coded ICF interventions were then linked to the EICSS. This action involved placing the ICF coded interventions under the less specific EICSS second level categories. As a result of this action, the original interventions were still represented but were now integrated under a less specific second level category. For example, the more specific ICF code *d4103 sitting*, was represented under the EICSS second level code of *d410 changing basic body position*. This action revealed the ICF categories that could not be linked and consequently were not represented in the EICSS.

The following section describes the method used to count the interventions linked to ICF and EICSS codes, the ICF and EICSS codes linked to Māori and non-Māori, and the ICF and EICSS codes linked to health professionals.

1. The Excel spread sheet for each patient file was checked to ensure the correct code was assigned to each intervention. The sort mechanism on Excel was then used to sort the ICF codes for each of the 18 patient files into alphabetical order. Sorting the codes in this way meant the associated information, such as the intervention and health professional who delivered it were still linked with the ICF code.
2. The data from the 18 patient spread sheets were manually copied into a summary Excel spread sheet. The summary document contained the linked

ICF code and the health professional that provided the intervention for each of the 18 patients. A sample of the summary sheet can be seen in Appendix B1.

3. In order to generate a list of all the ICF codes used across the 18 spread sheets, all the ICF codes from each patient were copied and pasted into one list. Following this the “Remove Duplicates” function was used to remove the duplicate ICF codes. This new list was called “ICF codes” and was transferred into the column headed AN on the summary sheet.
4. The COUNTIF formula =COUNTIF (A\$2: AJ\$266, AN2) was used to count the frequencies of the ICF codes across the 18 patient files in the summary sheet. The first part of the formula A\$2: AJ\$266, indicates the area of cells to be counted. The A and AJ represent the columns and the 2 and 266 represent the rows. The AN2 represents the criteria that will be counted in the range. In this case the criteria were the ICF codes in the AN2 column. The \$ sign indicates that the range is the stable component in the equation, whereas the AN2 part will change as the formula is dragged across the cells. Using this formula, the frequency of each ICF code was counted across all the data sets from the 18 patient files. The list of frequencies per ICF code was placed in column AO on the summary spread sheet.
5. The COUNTIF formula =COUNTIF (A\$2: R\$266, AN2) was used to count the frequency of the ICF codes for the Māori spread sheets. The part of the formula A\$2:R\$266, indicates the area that codes will be counted, i.e. all the columns from A to R and all the rows from 2 to 266. The letter code AN2 means count the frequency of ICF codes within the specified area. The

formula =COUNTIF (S\$2: AJ\$266, AN2) counted the frequency of ICF codes for the non-Māori data.

6. To obtain the number of times a specific health professional provided an intervention, the linked ICF category code and the health professional were merged so they formed one code. This was done by highlighting the ICF code and the health professional columns for each patient on the summary data sheet. For example, highlighting the column A2 and B2, and then using the formula =A2&B2, combined the ICF category and the health professional for Māori patient one. This action was done for all the 18 patients and created a new data set in columns AS to BJ.
7. A COUNTIF formula was used to count interventions that were linked to a specific health professional. For example, the formula to count physiotherapy interventions for Māori clients is = COUNTIF (AS\$2: BB\$266, \$BN2). The first part of the formula indicates the area where the merged codes will be counted: columns AS to BB and rows 2 to 266. The second part of the formula BN2 indicates what is to be counted, which in this case, are only the ICF codes linked to physiotherapy. The \$ symbol in this formula indicates that the criteria is stable, meaning the count will be in a specific area and only count a specific criteria. A similar COUNTIF formula was used to count the number and type of interventions provided by each health professional in the team across both Māori and non-Māori spread sheets.
8. To obtain the number of codes relating to the EICSS, the summary sheet was copied to another worksheet called “Total ECS”. A sample of the “Total ECS” spread sheet can be seen in Appendix B2. On this excel spread sheet,

headings at the top of the page identify what was counted, and the side headings indicate the ICF codes. A horizontal line was used to separate the third and fourth level codes so they were nested under each EICSS second level code. For example the codes *b1641*, *b1643*, *b1644* and *b1646* are under the second level code *b164 higher-level cognitive functions*. The frequencies of all the codes under each second level code were counted for the total number of EICSS codes and those linked to Māori, non-Māori, and health professionals. The codes were then integrated under chapter headings and codes were manually counted for each EICSS chapter heading and chapter headings linked to Māori, non- Māori, and health professionals.

3.8 Analysis

Following these steps it was possible to determine the frequency of interventions against the 166 EICSS codes, the number and type of interventions provided to Māori and non-Māori, and the number and type of interventions provided by each professional. To find general trends and to compare categories the data were transformed into graphs. In order to do this, the data were merged under the 26 headings linked to a chapter or chapter block heading of the ICF. A “block” is group of categories that link to a similar concept. The choice of headings was based on whether the headings reflected the data. For example, as there were no data related to chapter 7 of the activities and participation component on interpersonal interactions and relationships, this chapter heading was not included in the bar graph.

Table 3 outlines the EICSS codes present in the data and how they were linked to chapter and sub chapter headings in the graphs.

To determine whether coding interventions to the EICSS could provide clinically useful feedback to the team, the analysis was guided by the following questions:

- a) What chapters of the EICSS were not represented?
- b) What chapters of the EICSS had low or high frequencies of interventions?
- c) Are these findings the same or different from the findings of other studies?
- d) What are the possible reasons for the findings?
- e) What do these findings mean for the patients receiving rehabilitation?

The results of the analysis were shared with the team at a team meeting. Team members were asked to comment on the validity of the results, and whether the results were useful feedback that could prompt further actions. During this meeting, the researcher led the discussion and noted down team members' responses.

Table 3. Headings used in graphs

Chapter	Chapter or block	EICSS codes present in data
Body function		
1	Global mental functions	b110 consciousness b134 sleep
1	Specific mental functions	b140 attention b144 memory b156 perceptual b160 thought b164 higher level cognitive b167 mental functions of language b172 calculation b176 mental functions of sequencing complex movements
3	Voice and speech functions	b320 articulation b330 fluency and rhythm of speech
4	Functions of the cardiovascular system	b420 blood pressure
4	Respiratory systems	b450 additional respiratory functions
5	Functions of the digestive system	b510 ingestion b530 weight maintenance
7	Functions of the joints and bones	b710 mobility of joints
7	Muscle functions	b730 muscle power b735 muscle tone b740 muscle endurance
7	Movement functions	b755 involuntary movement b760 control of voluntary movement b770 gait pattern
8	Functions of the skin	b810 protective functions of skin
Activities & Participation		
1	Basic learning	d155 acquiring skills
1	Applying knowledge	d175 solving problems
2	General tasks and demands	D220 handling stress
3	Communication	d310 receiving spoken messages d325 receiving written messages d330 speaking d345 writing messages d350 conversation d360 using communication devices
4	Changing and maintaining body position	d410 changing basic body position d415 maintaining body position d420 transferring oneself
4	Carrying moving and handling	d430 lifting and carrying objects d440 fine hand use d445 hand and arm

Chapter	Chapter or block	EICSS codes present in data
4	Walking and moving	d450 walking d455 moving around, by means other than walking d460 moving around in different locations
4	Using transportation	d475 driving
5	Self-care	d510 washing oneself d540 dressing d560 drinking d570 looking after one's health
6	House hold tasks	d630 preparing meals d640 doing house work
8	Work and employment	d850 remunerative employment
9	Community social and civic life	d920 recreation and leisure
1	Products and technology	e110 products for personal consumption e115 products for personal use in ADL e120 products and technology for personal mobility e155 design and construction of buildings for private use e165 assets
3	Supports and relationships	e310 immediate family e340 personal care providers and assistants e355 health professionals e360 other professionals
5	Services, systems and policies	e515 architecture and construction services, systems and policies e525 housing services, systems and policies e540 transportation services, systems and policies e550 legal services, systems and policies e555 associations and organisation services systems and policies e570 social security services systems and policies e575 general social support services systems and policies e580 health services, systems and policies

3.9 Level of disability

In the community stroke rehabilitation service Barthel Index (BI) scores are collected on admission and discharge. There are several versions of the BI and the version used in this service was developed by Collin et al. (1988). In this version the total score is out of

20 rather than 100, and the increments per item have been reduced from 5 to 3 (Collin et al., 1988). The Collin et al. (1988) version of the BI has good to moderate inter-rater reliability for individual items (0.53-0.94), and excellent inter-rater reliability for the total score (0.94) (Hsueh, Lee, & Hsieh, 2001). Internal consistency of the 10 items in the BI was found to be excellent with Cronbach's alpha coefficients ranging from 0.89-0.92 (Hsueh et al., 2001). Test- retest reliability studies have confirmed that the BI is a reliable tool (Green et al., 2001).

Out of the 18 patients, eight Māori and eight non-Māori patients had their BI score recorded in the notes, prior to treatment. A BI, of 0-9 indicates severe disability; 10-14 moderately disabled; 15-19 mildly disabled and 20 indicates independence (Wade & Hewer, 1987). Based on this classification, levels of disability prior to intervention were compared for eight Māori and eight non-Māori, using a bar chart.

In summary, the first section of the chapter outlined the ethical processes used, the eligibility criteria for the inclusion of patient records, methods of data extraction based on previous research, strategies employed to improve the reliability of the results and the data analysis plan. The next chapter will present the research results.

Chapter 4. Results

This chapter will outline the results from coding the interventions documented in 18 patient records to the Extended ICF Core Set for Stroke (EICSS). The interventions were provided by a community stroke rehabilitation team during 2010 and 2011.

There were 18 patient records used in this research, of which nine patients were Māori and nine were non-Māori. The non-Māori group comprised of two Samoan, and seven New Zealand European patients. The characteristics of each group are described in Table 4 and Table 5. For the 18 patients, the average age was 73 years old, 11 were females and seven were males, eight had a right cerebrovascular accident and 10 a left cerebrovascular accident. Of the 18 patients, 14 were living with family members, nine had communication impairment, 10 had cognitive impairment and one patient was working prior to the stroke. There are some important differences between the two groups. Māori were on average younger (69 years old) than non-Māori (78 years old). All the Māori patients were living with family, compared to five out of nine of the non-Māori group. A comparison of the Barthel Index score on admission to the community rehabilitation service (Figure 2), indicates that Māori patients had greater levels of impairment than non-Māori, and more Māori than non-Māori had communication and cognitive impairment (Table 4 and Table 5). Furthermore, on average Māori had more weeks of rehabilitation (14) compared to non-Māori (13).

Table 4. Characteristics of Māori

Age	M/F	CVA	Admit BI	Living with family	Rehab Weeks	Impaired Communication	Impaired Cognition
67	F	R	20/20	Y	9	-	Y
77	M	L	~	Y	6	Y	-
69	F	L	1/20	Y	22*	Y	-
69	M	R	19/20	Y	14*	Y	Y
71	F	L	0/20	Y	23*	Y	Y
70	F	L	7/20	Y	18*	Y	Y
61	M	L	18/20	Y	13	Y	Y
66	F	R	19/20	Y	5	-	Y
71	F	R	11/20	Y	19	-	Y

Key:* Patient had two admissions, ~ no data recorded

Table 5. Characteristics of non-Māori

Age	M/F	CVA	Admit BI	Living with family	Rehab Weeks	Impaired Communication	Impaired Cognition
79	F	R	19/20	N	10	Y	-
81	M	R	19/20	N	14	-	Y
84	F	L	19/20	N	8	Y	Y
83	F	R	13/20	Y	18	-	-
84 S	F	R	5/20	Y	23	-	-
63 S	F	L	13/20	Y	10	-	Y
73	M	L	~	Y	9	-	-
68	M	L	20/20	Y	12	Y	-
87	M	L	18/20	N	15	Y	-

Key:* Patient had two admissions, ~ no data recorded, S Samoan ethnicity

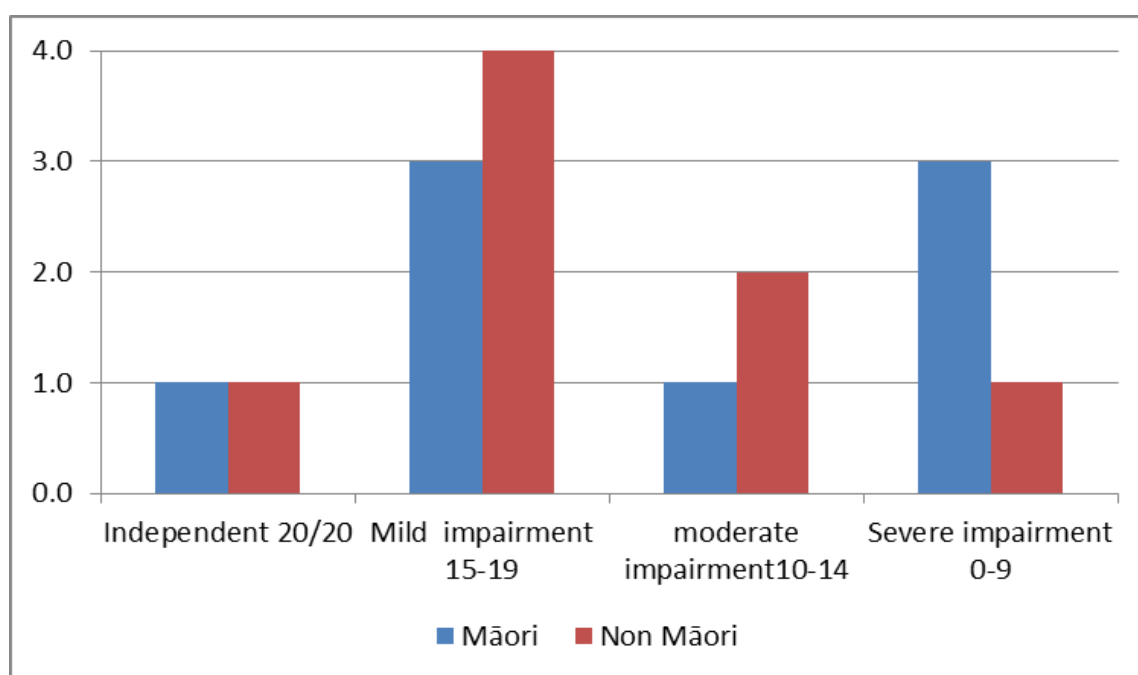


Figure 2. A comparison of disability level using the admission Barthel Index score for eight Māori and eight Non-Māori.

All of the 1361 interventions recorded by the community rehabilitation team could be coded to an ICF category. Consequently, in relation to rule 5 of the coding guidelines, no categories were assigned as “non-definable” or “nd (Cieza et al., 2005). Of these 1361 interventions 1345 (98.8%) could be coded to the EICSS. The 16 interventions that were not covered under the EICSS were: *b820 repair functions of the skin* (1), *s760 structure of trunk* (5), *d660 assisting others* (9), and *e535 communication services, systems and policies* (1).

As seen in Table 6, the highest percentage of interventions that could be coded to the EICSS were coded as body function (40.1%), followed by activities and participation (36.7%), the environment (22.5%), and body structures (0.8%).

Non-Māori received a total of 713 (53%) interventions compared to Māori who received 632 (47%), and had a higher number of interventions than Māori in the components of body function, activities and participation and body structure. This trend was reversed in

the environment domain with Māori receiving 169 interventions and non-Māori, 133 interventions. The most frequently provided interventions to Māori were in the body function component (266) and the most frequently provided interventions for non-Māori was in the activities and participation component (300).

Table 6. Total frequency and percentage of interventions, linked to the ICF and EICSS components

ICF component	Total no. of codes in data		Total % of interventions for							
	ICF	EICSS	ICF		EICSS		Māori EICSS		Non-Māori EICSS	
Body function	49	25	540 (39.7%)		539 (40.0%)		266 (19.8%)		273 (20.3%)	
Body structure	4	2	16 (1.1%)		11 (0.8%)		4 (0.3%)		7 (0.5%)	
Activities and participation	66	27	502 (36.9%)		493 (36.7%)		193 (14.3%)		300 (22.3%)	
Environment	30	17	303 (22.3%)		302 (22.5%)		169 (12.6%)		133 (9.9%)	
Total	149	71	1361		1345		632 (47.0%)		713 (53.0%)	

Table 7 lists the five most frequently reported ICF categories under each ICF component. Interventions were most frequently coded to: *b7301 power of muscles of one limb* (93), *e1201 general products for personal indoor and outdoor mobility* (75), *d4600 moving around the home* (71), *d4103 sitting* (60) and *b7600 control of simple voluntary movement* (59). The combined frequencies of these categories account for 26.6% of the total number of EICSS interventions.

Table 7. The five most frequent categories in each ICF component

Body Structure and Function	ICF Code	Frequency
Power of muscles of one limb	b7301	93
Control of simple voluntary movements	b7600	59
Perceptual functions, and awareness of the body and space	b156	40
Involuntary movement functions	b755	34
Insight	b1644	33
Activities and Participation		
Moving around within the home	d4600	71
Sitting	d4103	60
Releasing	d4403	45
Moving around outside the home and other buildings	d4602	44
Picking up	d4401	44
Environment		
General products for personal indoor and outdoor mobility	e1201	75
Assistive products and technology for personal use in daily living	e1151	37
Health professionals	e355	34
Personal care providers	e340	28
Health systems	e5801	28

The 166 ICF categories represented in the EICSS were chosen so that it could be used in all clinical settings (Glässel et al., 2011). To evaluate whether the EICSS represents people with stroke in the community, Table 8 compares the number of second level categories for each chapter in the EICSS with the number of categories from each chapter found in the data.

Five EICSS chapters had a greater proportion of their second level categories represented in the data: mental function (10 out of 17), neuro-musculoskeletal and movement related functions (7 out of 9), mobility related to activities and participation (10 out of 12), communication (6 out of 8) and services systems and policies (8 out of 10).

There were 10 EICSS chapters and their associated second level categories that were not represented in the data. In the body function component, two out of eight chapters were not represented in the data; sensory functions and pain, and genitourinary and reproductive functions. The EICSS has only five body structure chapters as the ICF chapters 2, 3 and 6 are not included. Out of the five body structure EICSS chapters, three chapters were not represented in the data. The missing chapters were: structures relating to the nervous system, the cardiovascular, haematological, immunological and respiratory systems, and the digestive system. Interpersonal interactions and relationships was the only chapter not represented in the activity and participation component data. In the environment component, two out of five chapters were not represented, and these were the natural environment, and attitudes.

Table 8. A comparison between the number of EICSS interventions per chapter and the chapters present in the data.

ICF Component	EICSS Chapter	Number of 2 nd level categories per chapter	Number of 2 nd level categories from each chapter in the data
Body Function	Totals	59	25
1. Mental function		17	10
2. Sensory functions and pain		9	-
3. Voice and speech functions		4	2
4. Functions of cardiovascular, haematological, immunological, and respiratory system		8	3
5. Functions of the digestive, metabolic and endocrine system		8	2
6. Genitourinary and reproductive functions		3	-
7. Neuro-musculoskeletal and movement related functions		9	7
8. Functions of the skin and related structures		1	1
Body Structure	Totals	11	3
1. Structures relating to the nervous system		3	-
4. Cardiovascular, haematological, immunological, and respiratory systems		2	-
5. Digestive system		1	-
7. Movement		4	2
8. Structures of skin		1	1
Activities and Participation	Totals	59	27
1. Learning and apply knowledge		12	2
2. General tasks and demands		4	1
3. Communication		8	6
4. Mobility		12	10
5. Self-care		7	4
6. Domestic life		3	2
7. Interpersonal interactions and relationships		4	-
8. Major life areas		5	1
9. Community, social and civic life		4	1
Environment	Totals	37	17
1. Products and technology		8	5
2. Natural environment		3	-
3. Support and relationships		7	4
4. Attitudes		9	-
5. Services, systems and policies		10	8

NB: There are no chapters 2, 3 and 6, in the body structure component of the EICSS

The frequency and percentage of interventions in the body function component are presented in Table 9 and Figure 3. Of this group the highest frequency interventions were: *b730 muscle power* (10.7%), *b760 control of voluntary movement* (7.6%), *b164 higher level cognitive functions* (3.3%) and *b156 perceptual functions and awareness of the body and space* (3.0%). The least frequently provided interventions were *b110 consciousness*, *b134 sleep*, and *b330 fluency and rhythm of speech*, each of which was delivered only once. In the body structure component, interventions were coded against only two categories *s730 structure of the upper extremity* (0.7%) and *s750 structure of the lower extremity* (0.1%).

Table 9. The total number of interventions coded against each EICSS category for body function and structure.

Chapter blocks present in the data	EICSS category	No.	% of total count
Body Function			
1. Global mental functions	b110 consciousness	1	0.1
	b134 sleep	1	0.1
1. Specific mental functions	b140 attention	17	1.3
	b144 memory	17	1.3
	b156 perceptual	2	0.1
	b156 perceptual and awareness of the body and space	40	3.0
	b160 thought	3	0.2
	b164 higher level cognitive	44	3.3
	b167 mental functions of language	22	1.6
	b172 calculation	6	0.5
	b176 mental functions of sequencing complex movts	2	0.1
3. Voice and speech functions	b320 articulation	9	0.76
	b330 fluency and rhythm of speech	1	0.1
4. Functions of the cardiovascular system and respiratory systems	b420 blood pressure	4	0.3
	b450 additional respiratory functions	3	0.2
	b455 exercise tolerance	6	0.4
5. Functions of the digestive system	b510 ingestion	4	0.3
	b530 weight maintenance	7	0.5
7. Functions of the joints and bones	b710 mobility of joints	21	1.6
7. Muscle functions	b730 muscle power	144	10.7
	b735 muscle tone	3	0.2
	b740 muscle endurance	28	2.1
7. Movement functions	b755 involuntary movement	34	2.5
	b760 control of voluntary movement	102	7.6
	b770 gait pattern	13	1.0
8. Function of the skin	b810 protective functions of skin	5	0.4
Body Structure			
7. Upper extremity	s730 structure of upper extremity	10	0.7
7. Lower extremity	S750 structure of the lower extremity	1	0.1

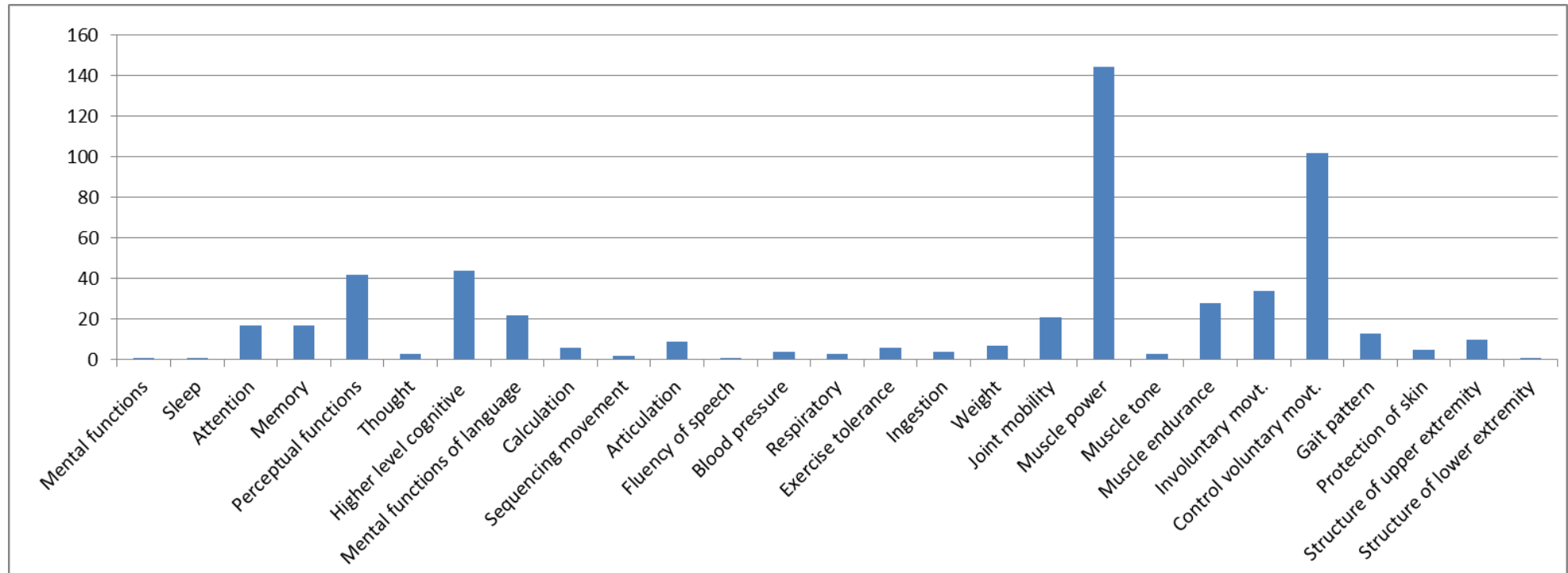


Figure 3. Frequency of interventions for the EICSS Body Function and Body Structure categories

Table 10 and Figure 4 display the frequency and percentage of interventions related to the activities and participation component of the EICSS. The most frequent interventions in this component were *d460 moving around in different locations* (8.6%), *d440 fine hand use* (8.5%), *d410 changing basic body position* (7.1%), *d445 hand and arm* (2.5%), and *d570 looking after one's health* (1.5%). Of this group, the highest number of interventions came from chapter 4, mobility. The least number of interventions related to the categories: *d240 handling stress* (0.1%), *d310 receiving spoken messages* (0.1%), *d175 solving problems* (0.1%), *d560 drinking* (0.1%), *d850 remunerative employment* (0.1%), *d415 maintaining body position* (0.2%) and *d940 recreation and leisure* (0.3%).

Table 10. The total frequencies of interventions coded against each EICSS category for activities and participation

	Chapters and chapter blocks present in the data	EICSS category	No.	% of total count
Activities & Participation	1. Basic learning	d155 acquiring skills	11	0.8
	1. Applying knowledge	d175 solving problems	2	0.1
	2. General tasks and demands	d240 handling stress	1	0.1
	3. Communication	d310 receiving spoken messages	1	0.1
		d325 receiving written messages	2	0.1
		d330 speaking	2	0.1
		d345 writing messages	2	0.1
		d350 conversation	2	0.1
		d360 using communication devices	2	0.1
	4. Mobility: Changing & maintaining body position	d410 changing basic body position	95	7.1
		d415 maintaining body position	3	0.2
		d420 transferring oneself	8	0.6
	4. Mobility: Carrying and handling	d430 lifting & carrying objects	6	0.4
		d440 fine hand use	114	8.5
		d445 hand and arm	33	2.5
	4. Mobility: Walking and moving	d450 walking	4	0.3
		d455 moving around, by means other than walking	9	0.7
		d460 moving around in different locations	115	8.6
	4. Mobility: Driving	d475 driving	12	0.9
	5. Self-care	d510 washing oneself	6	0.4
		d540 dressing	11	0.8
		d560 drinking	2	0.1
		d570 looking after one’s health	20	1.5
	6. House hold tasks	d630 preparing meals	10	0.7
		d640 doing house work	14	1.0
	8.Work	d850 remunerative employment	2	0.1
	9. Community social and civic life	d920 recreation and leisure	4	0.3

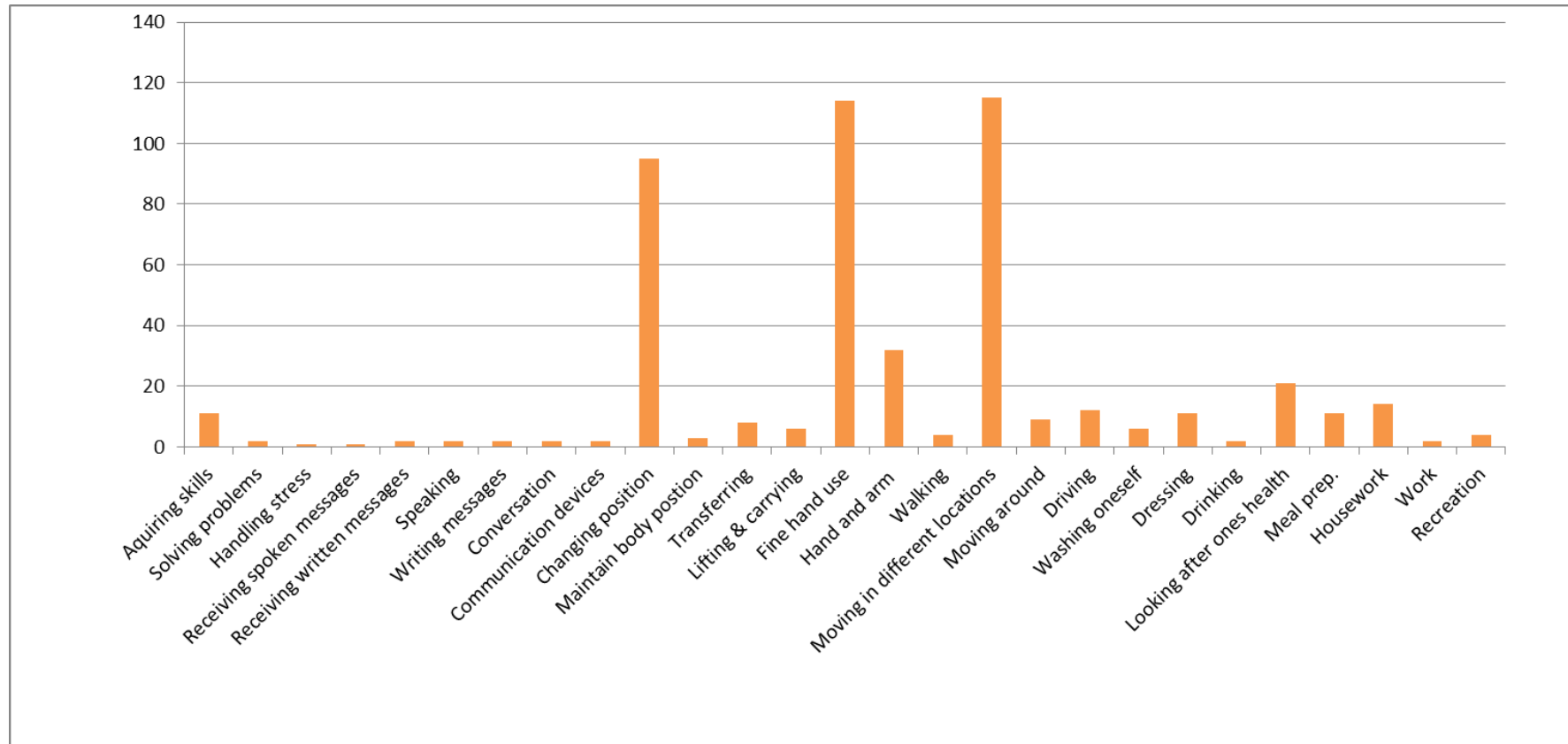


Figure 4. Frequencies of interventions coded against EICSS Activities and Participation

Table 11 and Figure 5 present the frequency and percentage of interventions coded against the EICSS categories in the environment component. The four most frequent interventions related to: *e120 products and technology for personal mobility* (5.7%), *e115 products for personal use in ADL* (3.1%), *e580 health services, systems and policies* (3.0%) and *e355 health professionals* (2.5%). The least frequent interventions related to: *e515 architecture and construction* (0.1%), *e550 legal services, systems and policies* (0.1%), *e360 other professionals* (0.1%) and *e570 general social support services, systems and policies* (0.1%).

Table 11. The total frequencies of interventions coded against each EICSS category for the environment

	Chapters and chapter blocks present in the data	EICSS category	No.	% of total count
Environment	1. Products and technology	e110 products for personal consumption	3	0.2
		e115 products for personal use in ADL	42	3.1
		e120 products and technology for personal mobility	76	5.7
		e155 design and construction of buildings for private use	19	1.4
		e165 assets	4	0.3
	3. Supports and relationships	e310 immediate family	23	1.7
		e340 personal care providers and assistants	28	2.1
		e355 health professionals	34	2.5
		e360 other professionals	2	0.1
	5. Services systems and policies	e515 architecture and construction services, systems & policies	1	0.1
		e525 housing services, systems & policies	5	0.4
		e540 transportation services systems & policies	5	0.4
		e550 legal services systems & policies	2	0.1
		e555 Associations organisations services, systems & policies	7	0.5
		e570 social security services system & policies	9	0.7
		e575 general social support services systems & policies	2	0.1
		e580 health services, systems & policies	40	3.0

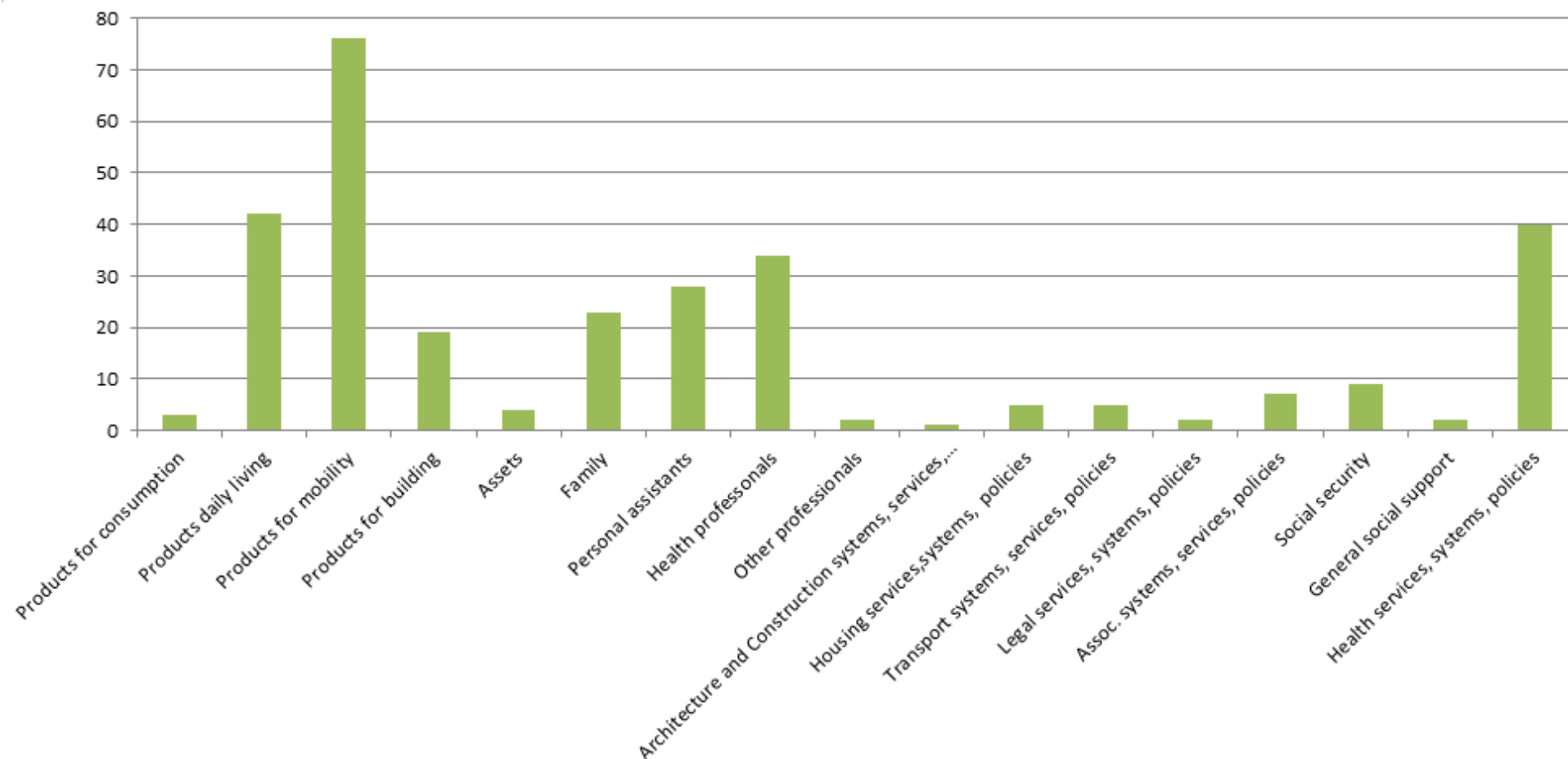


Figure 5. Frequencies of interventions coded against EICSS environment

Figure 6, the frequencies of specific interventions are integrated under 26 headings. Some headings represent a chapter, for example voice and speech, and cardio and respiratory. Other headings represent chapter blocks, which are related categories within a chapter. An example of chapter block headings are: joint and bone functions, muscle functions and movement functions which are within chapter 7. Neuromusculoskeletal and movement related functions. The chapter, chapter block, and category headings were chosen by the researcher to summarise the categories present in the data. From this bar chart it is evident that within the body function component, three headings, had the highest percentage of interventions overall: specific mental functions (11.4%), muscle functions (13.0%) and movement functions (11.0%).

Similar to the body function, the activities and participation component has a high percentage of interventions in the mobility related areas. The headings with the highest percentage of interventions were related to chapter 4. Mobility: changing or maintaining body position (7.9%), carrying and handling (11.4%) and walking (9.4%). In contrast, interventions with lower percentages related to chapter 2. General task demands; and chapter 8. Work, and chapter 9. Community, social and civic life. The low numbers for the general task demands chapter may have been the result of assigning interventions to the most specific category. For example, the intervention for dressing was coded to the “self-care” chapter rather than the less specific, “general task demand” chapter. The low number of interventions coded against the work heading can be linked to the fact that most of the clinical notes were for people over 65 years of age and only one patient of the files in the sample was working prior to the stroke. For chapter 9. Community social and civic life, there were no interventions recorded for the other categories in this

chapter: *d910 community life, d930 religion and spirituality, d940 human rights and d950 political life and citizenship.*

The highest percentage of interventions coded against the environment component, relate to chapter 1. Products and technology (10.7%) and specifically products for personal use, mobility and housing alterations.

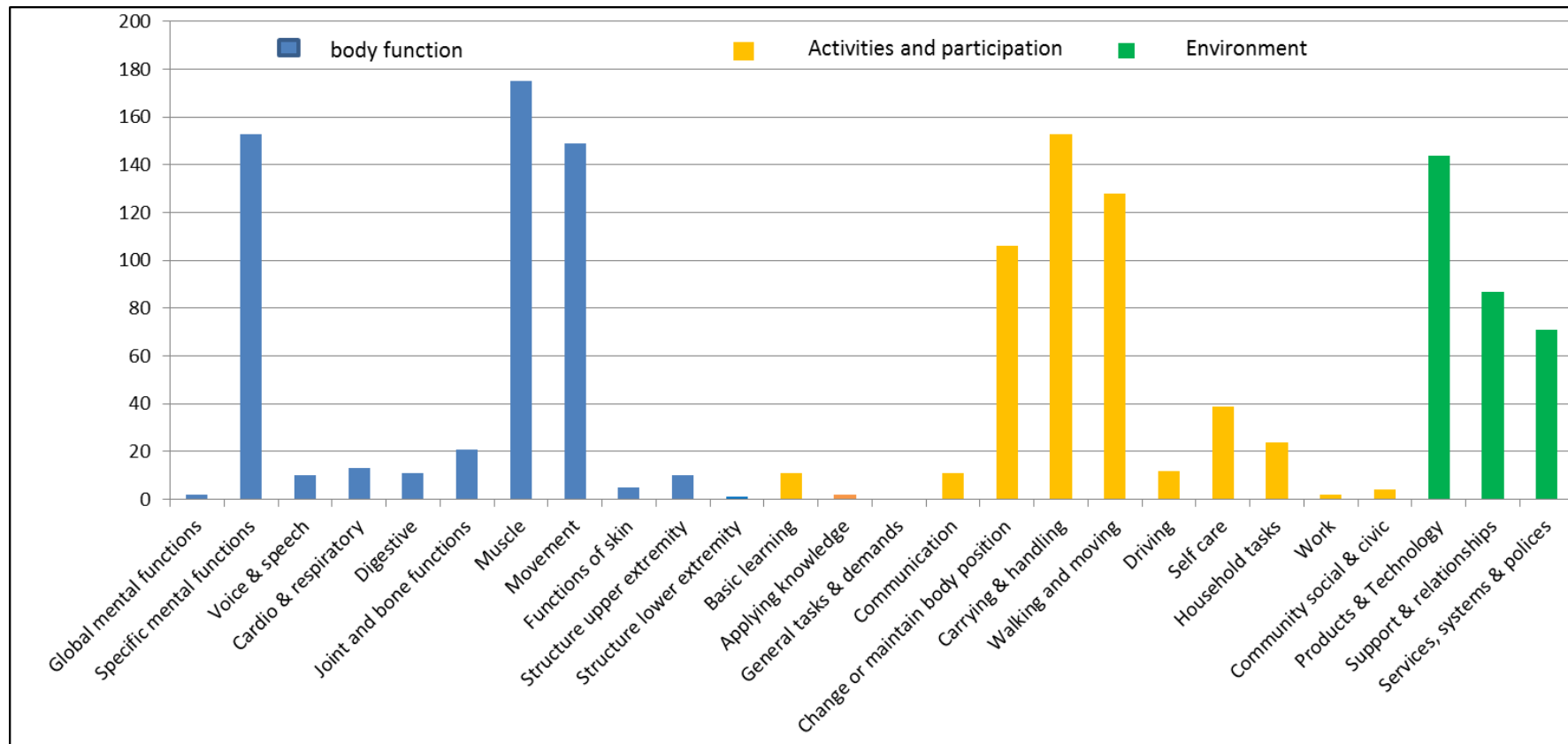


Figure 6. Total frequency of EICSS codes under 26 headings

Table 12 represents the frequency and type of interventions provided by each health professional in the community stroke team linked to 26 EICSS headings. Physiotherapy provided the highest number interventions for walking and moving (6.8%), muscle functions (6.1%), movement functions (6.1%) and changing and maintaining body position (4.2%). Occupational therapy provided the highest number of interventions for specific mental functions (6.4%), products and technology (5.9%), and services, systems and policies (3.5%). Speech therapy provided the highest number of interventions for voice and speech functions (0.7%) and communication (0.5%). The therapy assistant carries out interventions under the guidance of the physiotherapist, occupational therapist, speech therapist or nurse. The therapy assistant in this service provided intensive daily sessions to clients for a specific intervention. The therapy assistant provided interventions linked to 12 out of 26 headings. The highest numbers of interventions were in following headings: carrying and handling (7.3%), muscle functions (1.8%), walking and moving (1.7%), and movement functions (1.3%). The dietitian, social worker and nurse provided a smaller number of interventions compared to other health professionals and interventions related to two to four heading. For example, the dietitian provided interventions related to digestion functions and products and technology and the nurse provided interventions related to cardiovascular and respiratory functions, products and technology and support and relationships. The highest percentage of interventions was provided by occupational therapy (42%), followed by physiotherapy (33.5%), therapy assistant (16.1%), speech therapy (5.0%), social worker (1.7%), nurse (1.2%) and dietician (0.5%).

Table 12. Percentage of interventions linked to 26 EICSS headings for each health professional.

EICSS headings	PT	OT	SP	DT	SW	TA	N
Global mental functions	-	0.1	-	-	-	-	-
Specific mental functions	1.9	6.4	2.2	-	-	0.9	-
Voice & speech	-	-	0.7	-	-	-	-
Cardio & respiratory	0.1	0.2	0.4	-	-	-	0.2
Digestive	-	-	0.3	0.4	-	0.1	-
Joint and bone functions	0.7	0.2	-	-	-	0.2	-
Muscle functions	6.1	5.1	-	-	-	1.8	-
Movement functions	6.1	3.6	-	-	-	1.3	-
Functions of skin	-	0.4	-	-	-	-	-
Structure of upper extremity	0.2	0.5	-	-	-	-	-
Structure of lower extremity	0.1	-	-	-	-	-	-
Basic learning	0.1	0.4	0.1	-	-	0.1	-
Applying knowledge	0.1	0.1	-	-	-	-	-
General tasks & demands	-	-	-	-	0.1	-	-
Communication	0.1	0.2	0.5	-	-	-	-
Change or maintain body position	4.2	2.6	0.1	-	-	1.0	-
Carrying & handling	0.3	3.8	-	-	-	7.3	-
Walking and moving	6.8	1.0	-	-	-	1.7	-
Driving	0.1	0.8	-	-	-	-	-
Self-care	0.7	1.9	0.1	-	-	0.1	-
Household tasks	0.1	1.1	-	-	-	0.6	-
Work	-	0.1	-	-	-	-	-
Community social & civic	0.1	0.2	-	-	-	-	-
Products & Technology	3.6	5.9	-	0.1	0.4	0.7	0.1
Support & relationships	1.9	3.0	0.4	-	0.1	0.1	0.9
Services, systems & polices	0.4	3.5	0.1	-	1.1	0.1	-
Total	33.5	42.00	5.0	0.5	1.7	16.1	1.2

Key: PT: physiotherapy, OT: occupational therapy, SP: speech therapy, DT: dietician, SW: social work, TA: therapy assistant, N: nursing

In

Figure 7, there are 18 out 26 headings in which several health professionals are contributing to a shared intervention aim. This is particularly evident for the headings: specific mental functions, muscle functions, movement functions, changing and

maintaining basic body position, walking and moving, and products and technology. It appears from this graph that the professions might be duplicating the work of others. Therefore, a more detailed analysis of these interventions is presented in Table 13. In this table, the numbers of interventions provided by each health profession are linked to EICSS second level categories. From this analysis there are two areas in which both physiotherapy and occupational therapy appear to provide the same amount and type of intervention. The two areas are: muscle endurance (PT-12, OT-15, TA-1) and control of voluntary movement (PT-44, OT-44, TA-15). To provide more detail on the type of interventions provided in these two areas the interventions were linked to ICF third level categories in Table 14. From this analysis occupational therapy is providing more interventions to improve *b740 muscle endurance* in isolated muscles groups compared to physiotherapy (PT-0, OT-7). In regards to interventions to improve *b760 control of voluntary movement*, occupational therapists appear to providing more interventions to improve control of simple and complex movement (OT-43, PT-35) but physiotherapists are providing more interventions to improve movement control of the lower limb.

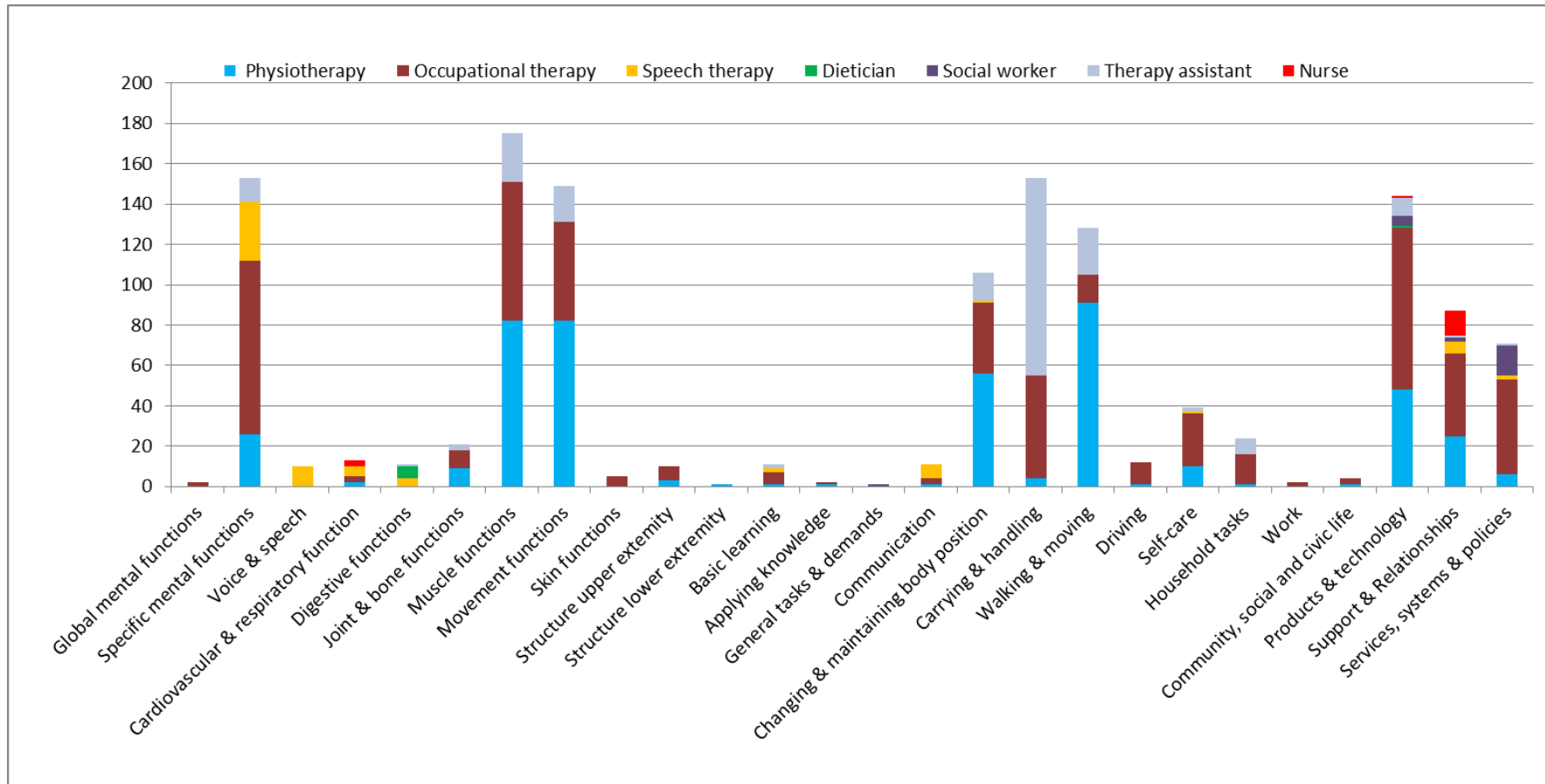


Figure 7. Frequency of health professional interventions linked to 26 EICSS headings

Table 13. Break down of selected headings in Table 9, which have a high number of interventions from more than one health professional.

EICSS Headings	EICSS category	EICSS code	PT	OT	TA	SP
Specific mental function						
	Attention	b140	1	15	-	1
	Memory	b144	2	14	-	1
	Perceptual	b156	13	17	12	-
	Thought	b160	-	3	-	-
	Higher level cog. functions	b164	8	35	-	5
	Mental functions language	b167	-	-	-	22
	Calculation	b172	-	6	-	-
	Sequencing	b176	2	-	-	-
Muscle functions						
	Muscle power	b730	69	53	22	-
	Muscle tone	b735	1	1	1	-
	Muscle endurance	b740	12	15	1	-
Movement functions						
	Involuntary movement reactions	b755	29	1	4	-
	Control of voluntary movt.	b760	44	44	14	-
	Gait pattern	b770	9	4	-	-
Changing and maintaining body position						
	Changing position	d410	50	30	14	1
	Maintaining position	d415	2	1	-	-
	Transferring	d420	4	4	-	-
Walking and moving						
	Walking	d450	2	-	-	-
	Moving around	d455	8	-	-	-
	Moving different locations	d460	81	14	22	-
Products and technology						
	Prod. consumption	e110	-	1	1	-
	Prod. daily living	e115	5	34	3	-
	Prod. transportation	e120	43	25	6	-
	Prod. building	e155	-	19	-	-
	Assets	e165	-	1	-	-

Table 14. Interventions for muscle functions, muscle endurance functions and control of voluntary movement under third level ICF categories provided by health profession

EICSS 2nd level category and code	EICSS category	3rd level code	PT	OT	TA	SP
Muscle function, b730						
	Power (P.)of isolated muscle groups	b7300	2	9	-	
	P. of muscles one limb	b7301	48	41	22	
	P. of muscles of one side of body	b7302	5	1	-	
	P. of muscles of lower half of body	b7303	5	-	-	
	P. of muscles of trunk	b7305	9	2	-	
Muscle endurance (M.E) b740						
	M.E isolated muscle groups	b7400	-	7	-	
	M.E muscle groups	b7401	12	8	1	
Control of voluntary movement (C.V.M.) b760						
	C.V.M. simple	b7600	34	41	-	
	C.V.M. complex	b7601	1	-	-	
	C.V.M. simple and complex performed in and orderly combination	b7602	-	2	-	
	Supportive functions of leg or arm	b7603	9	1	-	

Table 15 and Figure 8 compare the frequency of interventions per EICSS headings for Māori and non-Māori. Māori had a higher percentage of interventions than non-Māori in 16 of the 26 headings. In comparison, non-Māori had a higher percentage of interventions in 7 of the 26 headings. The headings in which non-Māori had 5% or more higher frequency compared to Māori were: movement functions (8.3% versus 2.8%), and carrying and handling (11.1% versus 0.3%). In contrast there were no headings in which Māori had more than a 5% frequency compared to non-Māori. There were 4 headings in which both Māori and non-Māori had similar frequencies. The headings in this category were muscle function (6.8%, and 6.2%), walking and moving (4.2% and 5.4%) products and technology (6.0% and 4.7%) and services, systems and policies (3.1%, and 2.2%).

Table 15. A comparison of interventions per EICSS headings to Māori and Non-Māori

EICSS chapter	Frequency of interventions	Māori	Non-Māori
Global mental functions	0.1	0.1	0.1
Specific mental functions	11.4	7.0	4.4
Voice & speech	0.7	-	0.7
Cardio & respiratory	1.0	0.5	0.4
Digestive functions	0.8	0.7	0.1
Joint and bone functions	1.6	1.5	0.1
Muscle functions	13.0	6.8	6.2
Movement functions	11.1	2.8	8.3
Functions of skin	0.4	0.4	-
Structure of upper extremity	0.7	0.3	0.4
Structure of lower extremity	0.1	0.1	-
Basic learning	0.8	0.7	0.1
Applying knowledge	0.1	0.1	-
General tasks & demands	0.1	0.1	-
Communication	0.8	0.8	-
Change or maintain body position	7.9	5.5	2.4
Carrying & handling	11.4	0.3	11.1
Walking and moving	9.5	4.2	5.4
Driving	0.9	0.4	0.5
Self-care	2.9	1.8	1.1
Household tasks	1.8	0.5	1.3
Work	0.1	0.1	-
Community social & civic	0.3	0.1	0.1
Products & Technology	10.7	4.7	6.0
Support & relationships	6.5	4.8	1.7
Services, systems & polices	5.3	3.1	2.2

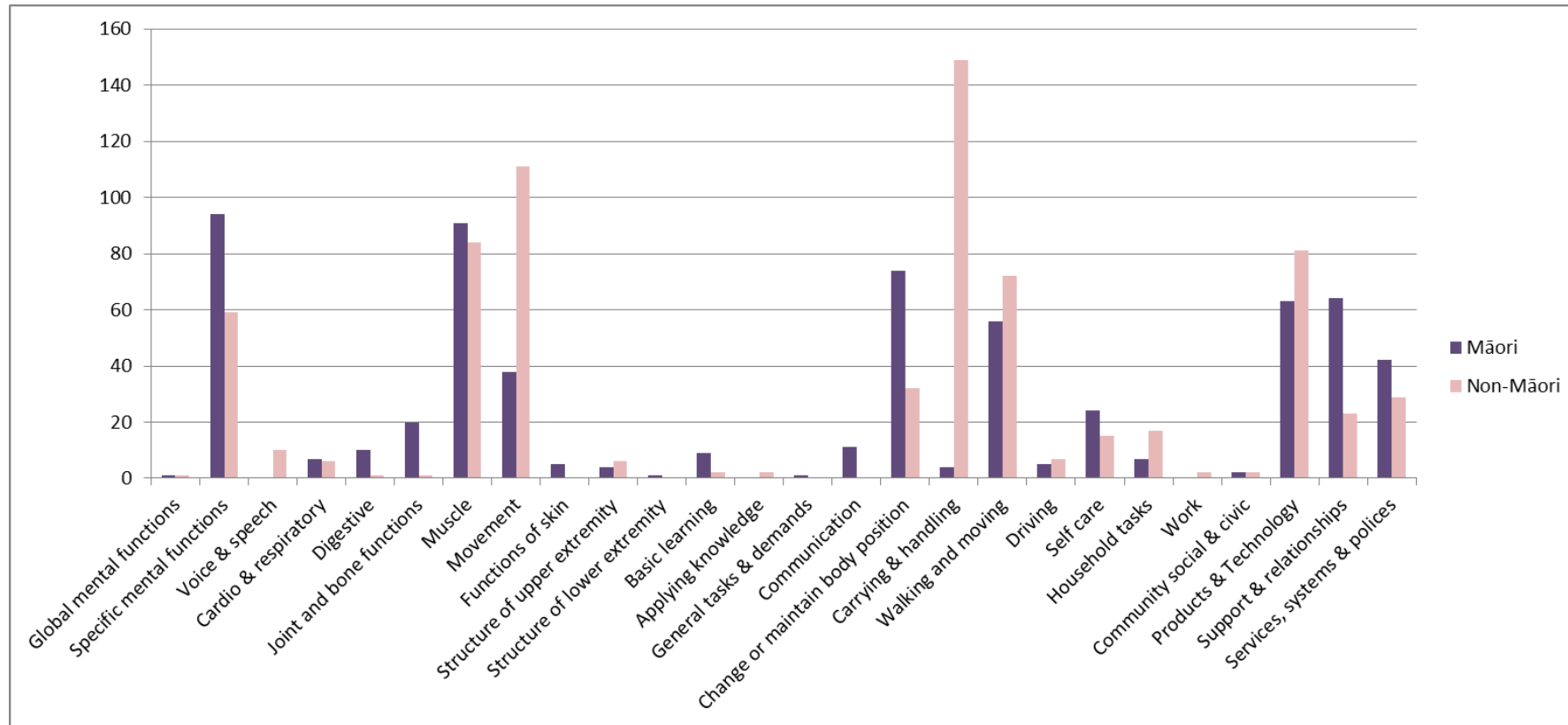


Figure 8. A comparison of coded interventions by EICSS headings to Māori and Non-Māori

4.1 Feedback on the Results from the Community Stroke Rehabilitation Team

Results of the research were shared at a community stroke rehabilitation team meeting which was attended by team the leader, two physiotherapists, two occupational therapists and a speech therapist. In readiness for this meeting the researcher provided the team a conference poster on the study results and a draft of the discussion chapter which discussed the main findings. The researcher led the meeting and noted down verbal responses.

In relation to the finding that the team provided a low frequency of interventions directed at emotional functions and interpersonal interactions and stress, one staff member reported she had already identified this gap and had developed a flow chart of actions to help staff address the emotional concerns of patients. In direct response to this research finding, the manager reported she had requested that a social worker be employed as part of the core team. These actions support the validity of this finding.

In regards to the finding that the team provided higher frequency of interventions for body impairment compared to activities and participation, several staff members reported that one of the first focuses of treatment was to reduce impairment and the secondary effects of impairment. When impairments were restored or if the patient had stopped improving, treatment focused on improving activities and participation. In response the researcher presented an alternative rehabilitation approach called “participate to learn” (Carlson et al. 2006). These concepts were unfamiliar to the team and they were reluctant to take up these ideas without stronger evidence for their effectiveness. Other team members thought the higher numbers of impairment related interventions may have been due to the sample having equal numbers of Māori patients,

who were more impaired than Non-Māori patients. Despite providing two different reasons for this result, the team were eager to increase the number of interventions related to activities and participation and were keen for the researcher to provide the team with on-going support and evidence on the effectiveness of interventions that improved both impairment, and activities and participation at the same time.

4.2 Summary

The aim of the study was to evaluate if the EICSS was able to capture the interventions of a community stroke rehabilitation team. In order to do this, the interventions documented in 18 patient records of the community stroke rehabilitation were coded to the EICSS. The result found that 98.8 % of interventions could be coded to the EICSS. The interventions that could not be coded to the EICSS related to repair functions of the skin, changing or maintaining the structure of the trunk, teaching family members management techniques, and referring patients on to services to improve communication. There were 10 chapters from the EICSS that were not represented in the data. The body function chapters not represented were: sensation and pain, and genitourinary and reproductive functions. The absent body structure chapters were: the nervous system, ear eye and related structures, voice and speech, cardiovascular haematological, immunological and respiratory systems and the digestive system. From the activities and participation chapter; interpersonal interactions and relationships, and the environment chapter, attitudes, were not represented. The results show a greater percentage of interventions coded to the body function component of the EICSS (40.1%), followed by interventions coded to activities and participation (36.7%), the environment (22.5%) and body structure (0.8%). The most frequent interventions for each component of the ICF were; body function *b730 muscle power* (10.1%), body

structure *s730 structure of the upper extremity* (0.7%), activities and participation *d460 moving around in different locations* (8.6%), and the environment *e120 products and technology for personal mobility* (5.7%),

Summarised data under 26 chapter and chapter block headings of the EICSS revealed that the chapters and chapter blocks with the highest interventions related to body function were chapter 1. Mental functions, and chapter 2. Neuromusculoskeletal and movement related functions. The highest percentage of interventions for activities and participation were in chapter 7. Mobility, and for the environment; chapter 1. Products and technology. It is evident that the chapters with the most interventions were related to mobility.

The 26 chapter and chapter block headings were used to analyse the type and frequency of interventions provided by each health profession in the community stroke rehabilitation team. There were 18 of the 26 heading, where more than one profession were working on the same broad intervention goal. Further analysis revealed that physiotherapists and occupational therapists were providing similar amounts of intervention for two, second level codes: *b740 muscle endurance* and *b760 control of voluntary movement*. The 26 chapters and chapter block headings were used to compare the type and frequency of interventions provided to Māori and non-Māori. Non-Māori received a higher percentage of interventions than Māori in the EICSS headings: movement functions and carrying and handling.

Taking the research findings back to the community stroke rehabilitation team provided confirmation of the results and allowed them to examine their clinical practice. The team was open to adopting different practices that may improve the rehabilitation outcomes for their patients.

Chapter 5. Discussion of Findings

This research aimed to investigate the extent to which the ICF and the Extended ICF Core Set for Stroke (EICSS) represent the interventions carried out by a community stroke team and has following objectives:

- A) Analyse the ICF and EICSS coded interventions to identify if any clinically important interventions are not represented by either the ICF or EICSS.
- B) Determine whether coding interventions to the ICF can generate clinically useful feedback to the team in relation to addressing the full range of patient concerns and the rehabilitation needs of Māori and non-Māori.

5.1 Gaps That This Study Has Addressed

The present study coded the interventions provided to people with stroke in the community to the EICSS, thus representing a phase in the treatment journey that was not well sampled in the preliminary studies that contributed to development and validation of the EICSS. Earlier the literature review suggested that there was a possible under representation of the allied health perspective as there was an over representation of medical professionals in the preliminary study for the Comprehensive ICF Core Set for Stroke (Weigl et al., 2004) and the consensus conference (Geyh, Cieza, et al., 2004). By contrast the present study captured allied health interventions provided by a community rehabilitation team.

An additional gap the study addresses is that the studies used to develop the EICSS and validate its use were conducted in Western Europe and consequently it is uncertain whether the EICSS is an accurate representation of problems experienced by stroke patients in other countries. New Zealand is a bicultural society and represents a different

health system compared to Western European health systems. Therefore this study contributes to the validation of the EICSS in NZ.

The chapter is organised in five parts. The first part relates to objective A. This part of the chapter will discuss the ICF and EICSS categories that did not represent interventions or where the meaning of the categories was unclear. The second part relates to objective B, and will discuss the findings that are relevant for the community stroke team. The third part discusses the strengths and weaknesses of the study. The fourth part explores the implications of the study for the validity and development of ICF and EICSS, the community stroke rehabilitation team, and use of the EICSS for service improvement. The fifth part makes recommendations for the future research and provides a conclusion.

5.2 Research Objective A:

- A) Compare the ICF and EICSS coded interventions to identify if any clinically important interventions are not represented by either the ICF or EICSS.

5.2.1 Interventions that did not link to the EICSS

This research found that 1.2% of interventions provided to people with stroke in the community could not be coded to the EICSS. Of the four ICF categories that make up the 1.2%, three have previously been reported as absent in the EICSS. The three categories that have already identified as missing from the EICSS are *s760 structure of the trunk*, *d660 assisting others*, and *e535 communication services, systems and policies*. As outlined in Appendix C, validation studies have found that *s760 structure of the trunk* was a relevant category for physiotherapists, occupational therapist and patients, *d660 assisting others* was a relevant for occupational therapists and patients

and *e535communication services, systems and policies* was relevant for patients (Glässel et al., 2012; Glässel et al., 2011; Glässel et al., 2010). As these results correspond to findings from previous studies, it strengthens the case that these categories should be added to the EICSS. The last category against which interventions could not be coded to in the EICSS was *b820 repair functions of the skin*. As this intervention was used only once across the 18 patient files, it may not be a common functional problem after stroke and therefore not a relevant category to be included in the EICSS.

The results of the present study did not confirm the findings of other studies which found the following categories were relevant for health professionals and patients: *b765 involuntary movement*, *b780 sensations related to muscles and movements*, *s770 additional musculoskeletal structures*, *d435 moving objects with the lower extremity*, and *d650 caring for household objects* (Glässel et al., 2011; Glässel et al., 2010; Lemberg et al., 2010).

5.2.2 Coding spatial neglect

This study supports the finding by Lemberg et al. (2010) that spatial neglect cannot be coded in the ICF. The impairment of “left neglect” or “spatial neglect” is commonly seen in patients with right hemisphere damage from stroke, tumour or brain injury (Minnemeier, 2011). A common definition for this phenomena is “the failure to report, respond, or orient to novel or meaningful stimuli presented in a specific location, when this failure cannot be attributed to either sensory or motor defects” (Heilman, Watson, & Valenstein, 2011, p. 296). In this study 3.0% of the total interventions were related to spatial neglect. It was difficult to code this intervention as the code *b156 perceptual functions* did not describe the intervention in enough depth and the other possible code

b1565 visuospatial perception did not accurately describe the intervention. This code is described as “Mental function involved in distinguishing by sight the relative position of objects in the environment or in relation to oneself” (World Health Organization, 2001, p. 56). This definition implies that this function is concerned with visually determining distances between objects and the self. Therefore, the researcher used rule three from the ICF coding guidelines, which states: “If the content of a meaningful concept is not explicitly named in the corresponding ICF category, the additional information that is not explicitly named in the ICF is documented” (Cieza et al., 2005, p. 215). Consequently, the researcher coded this concept to, “*b156 perceptual functions and awareness of the body and space*”. Coding spatial neglect has now partly been resolved by the published update of the ICF, with the inclusion of a new code: *b1144 orientation to space* and is defined as “mental functions that produce awareness of one’s body in relation to the immediate physical space”(World Health Organization, 2014). However, whilst this new code can adequately describe spatial neglect it does not describe a person’s neglect of the body as seen when patients only dress one side of the body or shave one side of the face (Minnemeier, 2011). More precise coding could be achieved by the addition of a new third level code under called *b1145 orientation to the body*.

5.2.3 Providing patient education

Lemberg et al. (2010) was the first to report that patient education came under the unclassified component of personal factors. Glässel et al. (2010) agreed with this proposal but later in similar study in 2011, found that there were two factors to consider in patient education. One was the attitudes of the patient that supported independence, such as self-management, compliance, and illness knowledge which could be classified

as a personal factors. The second factor was considered to be a concept that was unclassified in the current version of the ICF and was called, education about self and family about stroke (Glässer et al., 2011). In contrast Meesters et al. (2013) coded patient education to *d1 learning and applying knowledge*, and gave the following example of a goal that was coded to *d1*, “enlarging knowledge regarding RA receiving disease-related information from the team” (p. 894). The researcher in this present study did not code patient education to *d1 learning and applying knowledge* as it was thought learning concepts could not be coded to the categories provided in this chapter such as: learning from watching, and listening, learning to write, or learning a skill. In the present study, patient education was coded to the second level category *b164 higher level cognitive functions* and the more specific third level category of *b1644 insight*. The rationale for attributing education to this code being that education enables greater “awareness and understanding of oneself and ones behaviour” and fits the definition provided by the ICF (World Health Organization, 2001, p. 58). It appears that coding of patient education was not consistent, and further clarification was needed to increase consistency in ICF coding research. Once again this has been resolved with the addition of new code in the 2014 updated version of the ICF (World Health Organization). Patient education can now be linked to *d137 acquiring concepts* and is defined as “developing competence to understand and use basic and complex concepts related to characteristics, of things, persons or events”. This additional code is appropriate when describing patient education, and will improve the consistency of ICF coding in the future.

5.2.4 Intervention for posture and postural alignment

Glässel et al. (2010) and (Glässel et al., 2011) identified that the ICF does not encompass therapy interventions associated with posture and postural alignment. In the present study postural interventions were linked to body structure, as the aim of postural interventions is to maintain or improve the structural integrity of bones joints, muscles and ligaments. It would benefit the consistency of further coding research if there were guidelines on how functions relating to posture were developed.

5.2.5 Difficulty coding walking

As discussed in the results section, it was difficult to decide on the most appropriate code to describe walking short distances, as the meaning of the two codes *d4500 walking short distances* and *d4600 moving around within the home*, overlap. To provide more specific descriptions, this researcher used codes under *d460 moving around in different locations* as opposed to the codes under the category *d450 walking*. Although a rationale was provided for the choice of codes, the wording is open to interpretation, and it is likely that the walking codes will be used inconsistently in ICF coding research. An example of a different interpretation of the walking coding is provided by Meesters et al. (2013) who extracted and coded rehabilitation goals from patients with rheumatoid arthritis and coded them to the ICF Core Set for Rheumatoid Arthritis. They linked 23 goals the code *d450 walking*, and one goal was linked to the code *d460 moving around in different locations*. Lack of clarity for these codes needs to be reported on the ICF Update Platform for consideration by the Update and Revision Committee and WHO Family of International Classification Council.

5.3 Research Objective B)

B) Determine whether coding interventions to the ICF can generate clinically useful feedback to the team in relation to addressing the full range of patient concerns and the rehabilitation needs of Māori and non-Māori.

The first section will consider the results in relation to previous research findings and the second section will discuss the implications of these findings for the community rehabilitation team

5.3.1 Body function interventions

Overall a higher percentage of interventions were provided in the body function component compared to other components of the ICF. This result does not align with the information provided by the community stroke rehabilitation team as it states the aim of the community stroke rehabilitation service is to assist patients “to achieve goals by relearning skills and learning new ways to do activities” (Auckland District Health Board, 2013). The emphasis on being able to do activities is also supported by the fact that the outcome measures used by the service (Barthel Index and the Nottingham Extended Activities of Daily Living) have more activities and participation categories than body function categories.

The relatively high number of interventions linked to *b730 muscle power* (10.7%) and *d460 moving around in different locations* (8.6%) is similar to a recent study by Riberto, Lopes, Chiappetta, Lourenção, and Battistella (2013). This was a cross-sectional study in Brazil with 132 stroke patients receiving outpatient rehabilitation. The aim of the study was to validate the EICSS, by linking and quantifying the percentage of patients who had problems within each EICSS category. In the body function component, the two highest rating categories were *b770 gait pattern functions* (95.7%)

and *b730 muscle power functions* (86.4%) and the highest rating for activities and participation component was linked to *d450 walking* (92.9%). The high number of patients with mobility problems in Riberto et al.'s (2013) study highlights that decreased mobility is a major limitation after stroke. These results are similar to another study which recorded interventions provided to children with cerebral palsy (Tantilipikorn et al., 2012). They found the largest number of interventions were in the body function and activities and participation components related to chapter *b7 Neuromusculoskeletal and movement related functions* (39.41%), and chapter *a2 Mobility* (92.57%). The similarity of results of the present study to Riberto et al. (2013) and Tantilipikorn et al. (2012), may confirm that the NZ community stroke rehabilitation team are indeed working on the problems that are most frequently found in patients with stroke. This conclusion, however must be treated with caution given the limitations in Riberto et al.'s (2013) study. Its reliability can be questioned as the research method did not indicate how many people were used to extract and code patient problems and despite prior education sessions, multiple coders may have resulted in inconsistent coding decisions. Additionally the average age of participants was 59 years, which is similar to the Māori age of onset for stroke, but considerably younger than the age of stroke onset for European New Zealanders.

The greater frequency of interventions in the body function area could be due to the high levels of impairment within the sample group. This suggestion is supported by the fact that of the 18 patients, three had moderate impairment and four, severe impairment. From the small sample used in this study it is not possible to determine if patients with stroke are routinely discharged home with high levels of impairment although finding from others suggests this could be a possible explanation. Firstly, data collected in a 2009 study at Hutt Valley Hospital, NZ, found that patients received 18.3 days of acute

care and inpatient rehabilitation (Burgess et al., 2012), compared to 36 days of acute and inpatient rehabilitation reported in Ontario, Canada between 2008 and 2009 (Meyer, Britt, McHale, & Teasell, 2012). Secondly, families may feel capable of supporting the person with stroke, due to high levels of personal and domestic help available to the patient in the community. In New Zealand, after being assessed by the Needs Assessment Service Coordination Agency, a patient may be eligible for free individually tailored support that covers personal care, exercise, household activities and social outings (Enliven Maximising Independence, n.d.). Further research needs to be done in the NZ context to identify whether stroke patients have high levels of impairment on discharge from hospital, and the average length of inpatient rehabilitation after stroke. With this information it would be possible to compare hospital processes and outcomes in NZ with other countries. These questions may be answered by the Auckland Regional Community Stroke Study (1V) which aims to assess the impact of socio-economic circumstances, ethnicity, case mix, and quality of healthcare delivery, on stroke recovery (Health Improvement and Innovation Resource Centre, 2013).

5.3.2 Emotional functions and relationships

The present study found there were no interventions linked to *b152 emotional functions*, *d710 basic interpersonal interactions*, *d750 informal social relationships*, *d760 family relationships* and *d770 intimate relationships* and only one intervention was coded to *d240 handling stress*. The lack of attention to Chapter 7 Interpersonal interactions and relationships was also found by Alguerón et al. (2010), who interviewed patients at six weeks and three months after stroke using the EICSS. This is noteworthy as Allan et al. (2013) found that after one year post stroke, 31.7% of patients were classified with

depression, giving an incidence rate of 36.9 cases of depression per 100 people with stroke over one year. Limited interventions directed at improving emotional health and relationships could have occurred for the following reasons: patients did not have emotional concerns, patients were not assessed in this area, or staff may not have had the skills to discuss these issues with patients.

5.3.3 Community social and civic life

In the activities and participation component there were low numbers of interventions provided under chapter 9. Community social and civic life (0.3%). Tantilipikorn et al. (2012) similarly found only 2.23% of patient data was related to this category. The reasons for these results are unclear as social participation is a concern to patients with stroke. For example, Paanalahti, Lundgren-Nilsson, Arndt, and Sunnerhagen (2013) linked interview data from 22 people, one year post stroke to the Comprehensive ICF Core Set for Stroke, finding that 9 of the 22 participants identified problems with social participation. The study by Riberto et al. (2013) also found that many stroke outpatients considered they had problems with *d910 community life* (47.5%) and *d920 recreation and leisure* (66.0%). Despite patients concern on this issue, it may not be addressed by health professionals. This was demonstrated by a Canadian study by Korner-Bitensky, Desrosiers, and Rochette (2008) who collected responses from 663 occupational therapists to two practice scenarios in which the patients' had leisure and social participation issues. Of the 663 occupational therapists interviewed, 60.2% identified a problem relating to leisure or social participation, 23.1% reported they would use standardised assessment of leisure or social participation, and 36.5% would offer a leisure or social participation intervention. It is not clear in the present study if health professionals have addressed community life and recreation and leisure as the patients'

initial goals or assessments were not compared with the interventions that were provided.

One might speculate on the reasons for low numbers for interventions directed towards community social and civic life. It may be that in regards to intervention therapists hold a traditional view of rehabilitation that was criticised by Ylvisaker, Hanks, and Johnson-Greene (2002). From that perspective, interventions are sequenced hierarchically by first improving underlying impairments, then progressing to activity interventions, and then to participation interventions. The underlying principle being that improvements in the body function will generalise to activities and participation. If restoration of impairments is not possible, the therapist would use compensatory strategies to enable activity, and adaption of the task or environment to enable participation. Although Ylvisaker et al. (2002) were specifically referring to traditional interventions for cognitive rehabilitation with traumatic brain injury; a similar approach might have been practiced in this setting. This type of thinking reflects an earlier model of health called the International Classification of Impairments, Disabilities and Handicaps (World Health Organization, 1980) in which a linear progression is depicted from having a body impairment to an activity limitation which then restricts participation. Ylvisaker et al. (2002) have put forward an alternative treatment paradigm called the “contextualised approach”. This was later renamed as the “participate to learn” approach by Carlson et al. (2006). Using this approach the goal of therapy is to “help individuals to achieve their real world objectives and to participate in that world” (Ylvisaker et al., 2002, p. 194). Instead of focusing on treating impairments first, patients participate in activities in their normal environment using environmental supports and modifications. Through participating in this activity patients learn compensatory strategies, and improve underlying impairments. This thinking also underlies the ICF model as each component

is considered to have reciprocal relationships with other components. To date there has been little research testing out the ICF model, but a recent study by Egan, Davis, Dubouloz, Kessler, and Kubina (2014) followed 67 people with stroke and measured participation and emotional and physical well-being for 2 years post stroke. It found that participation in valued activities post stroke is significantly associated with improvement in emotional well-being, but found no significant change in physical well-being. The authors stated that the results indicated a 2-pronged approach to improve mood changes after stroke by providing medication to reduce symptoms and promoting engagement in “personally valued activities” (Egan et al., 2014, p. 5). There were some limitations in that the sample size was insufficient to determine the interaction effects of sex, age and level of disability on participation levels. Also, the sample did not include people with severe cognitive or communication difficulties.

5.3.4 Environmental factors

In the present study a smaller proportion of interventions (22.50%) were directed at the environment compared to the body function and activities and participation components and no environmental codes were attributed to chapter 2. Natural environment and human-made changes to the environment, and chapter 4. Attitudes. In contrast, all the environmental categories of the EICSS were validated by Riberto et al. (2013), and also the categories *e210 physical geography e450* and *e450 individual attitudes of health professionals* were validated by two studies addressing the patient perspective (Alguren et al., 2009; Glässel et al., 2012). In the present study there are no clear reasons why interventions were not assigned to these chapters.

The three most frequent environmental interventions in the present study were *e120 products and technology for personal mobility* (5.7%), *e115 products for personal use*

in ADL (3.1%) and e580 health services, systems and policies (3.0%). These categories did not correspond to the three most frequent environmental categories found by Algurén et al. (2009), which were *e110 products and substances for personal consumption, e310 immediate family, e315 extended family, and e570 social security systems, services and policies.* The sample group for Algurén et al.'s (2009) study was similar to the present study, in that both participants were a similar age, 6 weeks to 3 months post stroke and living at home. Differences in the environmental categories may reflect the unique health and social systems of the country. For example, in the present study the high number of codes directed to products for mobility and personal use may be explained by the NZ health system, in which equipment and housing alterations can be provided free to the patient. Due to local environmental conditions, it may not be helpful to make comparisons across studies for common environmental categories. It may be more helpful if researchers analysed how the environmental conditions of a particular place impacted on patient rehabilitation outcomes.

5.3.5 Māori compared to non-Māori

In this study the demographic data indicates that Māori patients in the service had strokes at a younger age than the non-Māori patients and this aligns with previously reported demographic data that Māori have earlier onset of stroke compared to non-Māori (McNaughton et al., 2011). In regards to levels of disability 6 months after stroke, it has been found that compared to non-Māori, Māori have higher scores on the Mental Component Summary score of the SF36 and lower scores on the Physical Component Summary score of the SF36 (McNaughton, Weatherall, McPherson, Taylor, & Harwood, 2002). In the present study Māori patients had higher impairment on entry to the service than non-Māori and received more interventions than non-Māori in the

areas of specific mental functions, changing or maintaining position, and support and relationships. These results can be linked to the higher numbers of Māori having a lower BI and more Māori having communication and cognitive impairment at admission to the community rehabilitation service. Non-Māori had more interventions than Māori in the following areas: movement functions, and carrying and handling. The reason for this result is unclear and further research is recommended to investigate the validity of this result and analyse the cause of these differences.

The finding that proportionally more Māori than non-Māori returned to live with family aligns with McNaughton et al.'s (2011) finding that 6 months post discharge, 86.2% of Māori were living with family, compared to 79.1% of Europeans. Further research is recommended to investigate if the presence of family members in the home influences the discharge decision for Māori and non-Māori patients. The results may have implications for future service provision for Māori.

5.3.6 Health professional focus

The results showed that health professionals are strongly linked to traditional work roles as there is a clear distinction in the therapy provided by the physiotherapist, occupational therapist, speech therapist, nurse and social worker. However it was also evident from the frequency of health professional interventions linked to 26 EICSS categories (Figure 6) that health professionals frequently work on the same areas of concern. This was particularly evident for: specific mental functions, muscle functions, movement functions, changing and maintaining body position, walking and moving and products and technology. Linking interventions to ICF categories did not make evident whether team members reinforced or duplicated the interventions that were provided by other professions. This was particularly the case for interventions provided by

physiotherapy and occupational therapy that were coded to two, second level codes: *b740 muscle endurance* and *b760 control of voluntary movement* (Table 13 and 14). These results are very similar to a study which compared the therapy content of physiotherapists and occupational therapists across four western European countries working in post-acute stroke rehabilitation (De Wit et al., 2006), which found a minor overlap of roles in the areas of selective movements (coordination and strength), mobilisation, and exercise in sitting balance. The authors concluded the overlap was present because both professions were working on underlying skills that prepared the patient for therapy activities that were specific to each profession, and this may also be the case in the present study.

It is evident that the therapy assistant plays an important role in the team to carry out interventions that are prescribed by the OT, SP and PT in relation to specific mental functions, muscle functions, movement functions, changing and maintaining body position, carrying and handling, house hold tasks and products and technology. From reading the patients' file, this role allowed patients to receive a higher intensity of therapy compared to receiving one visit from a health professional per week. The use of high intensity rehabilitation is supported by a systematic review which found in the first 6 months after stroke, 1 hour of therapy a day compared to 30 minutes a day, significantly improved function in activities of daily living (Kwakkel et al., 2004).

The results indicate low numbers of interventions were provided by nursing and social work professionals and no interventions provided by a psychologist. This particular service did not have a psychologist on staff but therapists were able to refer patients to a psychologist in another health service. It is possible that not having a psychologist as team member was a barrier to patients receiving this service.

5.4 Strengths and Limitations of the Study

5.4.1 Strengths

The patient files selected for this study reflect a “slice of life” in which interventions were provided in realistic conditions, as therapists and patients had no knowledge at the time that the files would be later used for research. As a result the interventions are free from therapist bias, and likely to represent actual recorded clinical practice.

The service expected all staff members to report their assessments, therapy sessions and communications in one file for each patient, via a computer. The notes were well written, logical, used an orderly time sequence, and frequently reported on previous goals and observations. These observations imply that the patient records were a truthful account of the interventions that were carried out with patients and indicate that the findings of this study are valid.

This research has sampled equal numbers of Māori and non-Māori and used the principle of “equal explanatory power” (Wellington School of Medicine and Health Science, 2002). Using this sampling method has revealed there are differences in service provision for Māori and non-Māori that warrant further investigation.

5.4.2 Limitations

In other studies that have linked information to the ICF, two researchers have independently extracted the concepts from the data and linked them to the ICF. The reliability of each researcher’s work was then checked by comparing samples of data (Fayed, Cieza, & Bickenbach, 2011). To improve reliability the sole researcher in the present study discussed the rationale for the extracted interventions and coding with two supervisors, and a list of coding decisions that would aid coding and enhance the rigour

of the data was maintained. On completion of data extraction and coding, all the files were reviewed to ensure that coding decisions were consistent with the coding decision list. To check that the intention of the interventions, was accurately interpreted the researcher presented samples of extracted interventions and coding to the community rehabilitation team. Feedback from this group was used to modify coding and contributed to the development of coding decision list.

The sample of patient records was not randomly chosen, and the patient records may not represent the majority of patients that are seen by the community stroke team and the interventions that are provided. As a consequence further research needs to be done to confirm these results.

Due to the small sample number of patient files the results cannot be generalised to other community stroke rehabilitation facilities. Notwithstanding, this research has found some trends that are consistent with larger studies.

It could be argued that the researcher's background as an occupational therapist may have influenced the type of interventions that were extracted. However the researcher has 10 years' experience of working in stroke rehabilitation teams and consequently has a good understanding of the roles of the various health disciplines and the interventions they provide.

It is possible that not all the interventions were recorded in the notes, and consequently the results may not be a true reflection of the interventions that were provided to patients. On feeding back the results of the study to the team, several staff mentioned they were surprised that the results did not show more interventions to improve social

participation. This raises the possibility that not all the interventions related to social and recreational activities were recorded.

5.5 Implications of the Research

5.5.1 Value of the study

It is important that the EICSS is a valid classification system so it can be used in clinical practice, research and the planning of future services. This study found that most interdisciplinary community stroke interventions provided to Māori and non-Māori could be linked to the EICSS. This indicates that the EICSS is a valid classification system of health states which can be used in community stroke rehabilitation services in NZ.

Three areas that would benefit from more precise coding descriptions were identified. Improvements in these areas would encourage use of the EICSS and consistent coding. The following suggested improvements are:

- Another third level code could be developed under *b114 orientation functions* to describe body awareness. This additional category could describe patients who are unaware of one side of their body.
- Clearer distinctions between the codes *d450 walking*, and *d460 moving around in different locations*. This would mean the addition of two new third level codes under the code 450 walking.

d4504 walking one to 10 meters within the home

d4505 walking for one to 10 metres outside the home and other buildings.

To avoid duplication of the concept of walking in code d460 Moving around in different locations it is recommended that the word ‘walking’ is removed from the description, and in the subsequent third level codes under this category. As a result the d460 codes would only refer to “moving the whole body from one place to another by means other than walking, climbing, running, skipping ..” (World Health Organization, 2001, p. 144).

- To describe a structural change in the body which has resulted in impaired posture to the body part or to the overall body posture the following second level codes could be added to the chapter 7. structures related to movement

s780 body part in alignment

s790 body parts in alignment.

Tantilipikorn et al. (2012) demonstrated that linking health service data to the ICF can generate useful information on service provision. Applying the EICSS to the interventions of community stroke rehabilitation service has provided information about the health professional role, the types of interventions provided to Māori and non-Māori, and how the service contributes to addressing the problems of stroke patients living in the community. The team and the manager of the service now have the opportunity to address the issues raised by this research, particularly in relation to the bullet points below:

- Patients seen by the community stroke team may be at risk of depression, as indicated by the known high incidence of depression after stroke (Allan et al., 2013). This conclusion is based on the fact there was a lack of interventions coded to emotional functioning, interpersonal interactions relationships and

stress and because a psychologist is not employed as a core team member in the community stroke rehabilitation team. It may be helpful for the manager of the service to discuss this finding with staff, to identify what emotional well-being screening assessments are provided and to identify further training needs.

- The EICSS could distinguish the interventions of different members of the team, but could not identify when therapists were reinforcing or duplicating the interventions of other health professionals. The team may wish to investigate this aspect of teamwork.
- There were low numbers of interventions provided by the nurse and social worker. The service may wish to investigate whether the number of referrals is appropriate for the work hours of these staff members. The low number of referrals may indicate that the service is under resourced in this area.
- There were higher numbers of interventions directed at body function compared to other ICF components, and low numbers of interventions for chapter 9. Community social and civic life. The reasons for this are unclear. It could mean therapists use a traditional treatment philosophy, and treating impairments is considered a priority over activities and participation. It may be of benefit to patients if staff members discussed how they could provide body function interventions to patients with high impairments, through assisting patients to re-engage with prior or new activities.
- The reason for the differing emphasis of interventions for Māori and non-Māori is unclear and warrants further consideration by the team.

Linking the EICSS to interventions has provided useful feedback to the community stroke rehabilitation team on whether the team are providing interventions that correspond to the main issues of patients with stroke. In addition, it has provided information on interventions provided by specific health professionals, and allowed the comparison of interventions provided to two different ethnic groups.

5.6 Theoretical Implications of Findings, and Their Influence on Understanding or Application of Knowledge

a) This study has shown that it is feasible to use the EICSS to evaluate a community stroke rehabilitation service in regards to the intervention focus, staff roles and provision of services for different ethnic groups. This finding aligns with a previous report of using the ICF-CY to categorise patient records and identify gaps in the management of the patients' rehabilitation (Tantilipikorn et al., 2012). Using this method to audit patient files against the EICSS may encourage services to provide more holistic treatment services. For instance the manager of the community stroke rehabilitation service involved in this study might use the findings to introduce staff education sessions to increase the activities and participation interventions and address the service gaps highlighted by these findings.

b) Auditing services against the EICSS compliments auditing a service against the New Zealand Clinical Guidelines for Stroke Management 2010 (Stroke Foundation of New Zealand and New Zealand Guidelines Group, 2010). The purpose of the guidelines is to assist health professionals to make decisions on the most effective type of therapy, whereas the EICSS identifies "what" patient problems should be considered when providing rehabilitation. Although the ICF model and the ICF stroke core sets are not included in the NZ Clinical Guidelines for Stroke Management 2010, the guidelines

encourage health professionals to “assess and manage aspects of care targeting interventions based on the WHO ICF model at the impairment, activity and participation level” (Stroke Foundation of New Zealand and New Zealand Guidelines Group, 2010, p. 152).

c) These findings indicate that it is possible to audit services by linking interventions documented in relatively small number of patient case records to the EICSS. Replicating this method across community stroke rehabilitation services would enable comparison of services and lead to the development of an accepted standard of practice.

d) This research contributes to the body of work investigating the validity of the EICSS (Algurén et al., 2010; Glässel et al., 2012; Glässel et al., 2011; Glässel et al., 2010; Lemberg et al., 2010). The implications of this on-going research are that the EICSS can be confidently used as a clinical reasoning tool for students and health professionals when working with patients with stroke (Atkinson & Nixon-Cave, 2011). Similarly, the EICSS could be used to guide the selection of assessment tools used in stroke rehabilitation and the documentation headings in patient notes. Using the EICSS in this way is also encouraged by Wiegand et al. (2012) and Escorpizo et al. (2010).

e) In the “Implemented ICF Update Proposals 2014” (World Health Organization, 2014) extra codes have been added to address the issue of coding left sided inattention and patient education. These refinements indicate that the ICF is a living document, supporting the value of reporting the recommendations related to body awareness, and postural alignment and the codes *d450 walking*, and *d460 moving around in different locations* to the ICF Update Committee.

f) These results support the observation by Algurén et al. (2009), that the environmental codes of the EICSS reflect the environmental health and social conditions of the country in which the research is carried out. Consequently it may not be useful to compare the environmental category interventions across studies. Instead it may be more useful to compare the environmental categories with patient outcomes of rehabilitation. From this it would be possible to determine what environmental aspects are most desirable for rehabilitation.

5.7 Recommendations

To repeat this research with a larger number of patient files for Māori and non-Māori, and from three or more community stroke rehabilitation services, to further validate the use of the EICSS in NZ and collect information which could serve as a bench mark to compare community stroke rehabilitation services. Limitations found in the present study could be addressed by introducing the following changes to the method:

- To improve reliability, two researchers could independently extract interventions from the patient files and link the interventions to the ICF. Following this process 10% of the interventions and linked ICF interventions could be randomly selected and assessed for consistency. All discrepancies would be discussed between the two researchers and a third person so there was an agreed consensus on the meaning of the intervention or the linked code.
- In order to ensure that the sample of patient records is representative of the service's usual practice, the patient records would be randomly selected. To use the principle of "equal explanatory power", and to take into account Māori are a

minority in many cities in NZ, random sampling with two ethnic strata would be used.

- To gather more precise information on the contribution of the various health professionals, data will be collected on the number of times a health professional supervises interventions originally provided by another professional. This type of data will determine whether health professionals are supporting or duplicating the work of others.
- To assess whether time in the service changed the type of interventions provided to patients, interventions would be coded to the EICSS and a time period such as weeks since admission. From this information it would be possible to tell if increased time in rehabilitation increased the number of activity and participation interventions.
- To assess whether impairment level influenced the type of interventions provided to patients, the interventions provided to mild, moderate or severely impaired patients would be compared. These data would provide more precise data on the treatment approach used by the community stroke rehabilitation staff.
- To assess whether staff are carrying out interventions that meet the patients' goals, future studies in this area could link patient goals, discharge reports and interventions to the EICSS. Comparisons between these three sets of data would indicate whether the community rehabilitation staff are being patient focused.

- To compare the outcomes of rehabilitation for Māori and the random sample group, data could be collected on outcomes pre and post community stroke rehabilitation. This information would indicate if Māori, on average needed additional time for rehabilitation.
- From the small sample in this research, it was not possible to evaluate if the high level of impairment seen was representative of most patients who receive community stroke rehabilitation. For future research to fully represent the NZ health setting and allow comparison with other overseas studies, it is recommended that data is collected on the number of inpatient days of rehabilitation and the outcomes of patients on hospital discharge. This information would answer the question whether NZ stroke patients are discharged home with high levels of impairment and allow further debate on whether patients are provided with enough rehabilitation.

5.8 Conclusion

This research has found that 98.8% of interventions provided by a community stroke rehabilitation team could be linked to the EICSS. This result supports validity of the ICF and EICSS in NZ and is encouraging to health professionals who may be considering using the EICSS in their practice. The interventions that could not be coded were linked to the categories *d660 assisting others*, *s760 structure of trunk* and *e535 communication services, systems and policies*. As this finding is supported by other studies it is recommended these categories be considered in future revisions of the EICSS. The walking and moving around codes had duplicate meanings and posture was not clearly described. These findings can be considered by the ICF update committee for inclusion in new versions of the ICF. Comparing the EICSS and the interventions of

the community stroke rehabilitation service has revealed that the service is providing limited emotional and relationship interventions, which indicates that patients may not be receiving appropriate support. The findings also indicate that more interventions were focused on body impairment rather than activities and participation, which may mean that patients are not receiving interventions that will help them develop or return to valued activities. This research confirms that by comparing interventions to the EICSS, it is possible to evaluate whether the service is addressing the full range of patient problems identified by the EICSS.

Appendix A1

Ethical approval from the Northern Regional Ethics Committee



Northern X Regional Ethics Committee
Private Bag 92522
Wellesley Street
Auckland 1141
Phone: (09) 580 9105
Fax (09) 580 9001
Email: northernx_ethicscommittee@moh.govt.nz

13 April 2012

Ms Melissa Evans
4 Bryers Place
Glenfield
Auckland

Dear Melissa

Re: Ethics ref: **NTX/12/EXP/083** (please quote in all correspondence)
Study title: To what extent do interventions by a community rehabilitation team, as documented in the medical records, address the Extended ICF Core Set for Stroke
Investigators: Ms Melissa Evans (Principal), A/Prof Paul Kersten (Supervisor)

Thank you for your letter and application received 10 April 2012.

The above study has been given ethical approval by the Chairperson of the Northern X Regional Ethics Committee under delegated authority. The Chair thanks the researcher for the detailed proposal and the attention to be paid to Maori consultation.

The following document was received and reviewed with the application
— Application for ADHB Institutional Approval

This approval is valid until 30 June 2013, provided that Annual Progress Reports are submitted (see below).

Amendments and Protocol Deviations

All significant amendments to this proposal must receive prior approval from the Committee. Significant amendments include (but are not limited to) changes to:

- the researcher responsible for the conduct of the study at a study site
- the addition of an extra study site
- the design or duration of the study
- the method of recruitment

Significant deviations from the approved protocol must be reported to the Committee as soon as possible.

Annual Progress Reports and Final Reports

The first Annual Progress Report for this study is due to the Committee by 13 April 2013. The Annual Report Form that should be used is available at www.ethicscommittees.health.govt.nz. Please note that if you do not provide a progress report by this date, ethical approval may be withdrawn.

A Final Report is also required at the conclusion of the study. The Final Report Form is also available at www.ethicscommittees.health.govt.nz.

We wish you all the best with your study.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Cheh'.

Cheh Chua(Ms)
Administrator
Northern X Regional Ethics Committee
cc: ADHB Research Office A+5492

Appendix A2

Approval from the ethics committee Auckland District Health Board



Research Office
Level 14, Support Bldg
Auckland City Hospital
PB 92024, Grafton, Auckland
Phone: 64 9 307 4949 Extn. 23854
Fax: 64 9 307 8913
Email: mwoodnorth@adhb.govt.nz
Website: www.adhb.govt.nz/ResearchOffice

30 April 2012

Melissa Evans
School of Occupational Health
AUT
90 Akoranga Drive
Northcote

Institutional Approval

Dear Melissa

RE: Research project (A+5492, NTX/12/EXP/085) To what extent do interventions by a community rehabilitation team, as documented in the medical records, address the Extended ICF Core Set for Stroke?

The Auckland DHB Research Review Committee (ADHB-RRC) would like to thank you for the opportunity to review your study and has given approval for your research project.

Your Institutional approval is dependant on the Research Office having up-to-date information and documentation relating to your research and being kept informed of any changes to your study. It is your responsibility to ensure you have kept Ethics and the Research Office up to date and have the appropriate approvals. ADHB approval may be withdrawn for your study if you do not keep the Research Office informed of the following:

- Any communication from Ethics Committees, including confirmation of annual ethics renewal
- Any amendment to study documentation
- Study completion, suspension or cancellation

More detailed information is included on the following page. If you have any questions please do not hesitate to contact me.

Yours sincerely

On behalf of the ADHB Research Review Committee
Dr Mary-Anne Woodnorth
Manager, Research
ADHB

c.c.
Jo-Anne Michaels-Mulder
Sandi Millner
Ebenezer Odoom

Appendix A3

Approval letter from the AUTC

M E M O R A N D U M

Auckland University of Technology Ethics Committee (AUTC)

To: Paula Kersten
 From: Rosemary Godbold Executive Secretary, AUTC
 Date: 7 June 2012
 Subject: Ethics Application Number 12/138 The extended international classification of functioning, disability and health core set for stroke. Does it capture community stroke interventions?

Dear Paula

I am pleased to advise that on 5 June 2012, the Chair of the Auckland University of Technology Ethics Committee (AUTC) and I have approved your ethics application. This delegated approval is made in accordance with section 5.3.3.2 of AUTC's *Applying for Ethics Approval: Guidelines and Procedures* and is subject to endorsement at AUTC's meeting on 25 June 2012.

Your ethics application is approved for a period of three years until 5 June 2015.

I advise that as part of the ethics approval process, you are required to submit the following to AUTC:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/research/research-ethics/ethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 5 June 2015;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/research/research-ethics/ethics>. This report is to be submitted either when the approval expires on 5 June 2015 or on completion of the project, whichever comes sooner;

It is a condition of approval that AUTC is notified of any adverse events or if the research does not commence. AUTC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are reminded that, as applicant, you are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

Please note that AUTC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to make the arrangements necessary to obtain this.

To enable us to provide you with efficient service, we ask that you use the application number and study title in all written and verbal correspondence with us. Should you have any further enquiries regarding this matter, you are welcome to contact me by email at ethics@aut.ac.nz or by telephone on 921 9999 at extension 6902. Alternatively you may contact your AUTC Faculty Representative (a list with contact details may be found in the Ethics Knowledge Base at <http://www.aut.ac.nz/research/research-ethics/ethics>).

On behalf of AUTC and myself, I wish you success with your research and look forward to reading about it in your reports.

Yours sincerely

Dr Rosemary Godbold
 Executive Secretary
 Auckland University of Technology Ethics Committee

Cc: Melissa Evans mevans@aut.ac.nz

Appendix B1

Sample of coding interventions to the ICF for Māori and health professionals

m1	m1 hp	m2	m2 hp	m3	m3 hp	m4	m4 hp	m5	m5 hp	m6	m6 hp	m7	m7 hp	m8	m8 hp	m9	m9 hp
b1550	ot	b144	sp	b5105	dt	b144	ot	b140	sp	b140	pt	b1565	ot	b1641	pt	b1342	ot
d445	ot	b1442	sp	b5105	sp	b1641	ot	b1400	ot	b1400	ot	b1565	ot	b1644	ot	b1565	ta
b1644	pt	b16700	sp	b7101	pt	b1644	sp	b156	ot	b1400	ot	b1644	sp	b1644	pt	b1565	ta
b7401	ot	b16710	sp	b7101	pt	b1644	ot	b1600	ot	b1400	ot	b1644	sp	b755	pt	b1565	ta
b7401	ot	b16711	sp	b7101	pt	b1644	ot	b1600	ot	b1440	ot	b1644	ot	b7302	pt	b1565	ot
b7100	ot	b16711	sp	b7101	pt	d155	ot	b1641	sp	b1440	ot	b16710	sp	b7302	pt	b1565	ot
b7101	pt	b16711	sp	b7101	pt	d310	sp	b1641	ot	b1565	ot	b16710	sp	b7302	ot	b1565	ot
b7101	pt	b28015	pt	s7300	ot	d330	sp	b1641	ot	b16710	sp	b16710	sp	b755	pt	b1565	ot
b730	ot	b7300	pt	s7300	pt	d350	sp	b1641	ot	b176	pt	b1720	ot	b755	ot	b1565	ot
b7300	ot	b7303	pt	s7300	pt	d350	sp	b1643	ot	b176	pt	b1720	ot	d4600	pt	b1565	ot
b7300	ot	b7303	pt	b7101	ot	d3602	sp	b1644	sp	b420	n	b1720	ot	d4600	pt	b1565	pt
b7301	ot	b7303	pt	b7101	ot	d3602	sp	b16710	sp	b420	n	b1720	ot	d4751	pt	b1565	pt
b7301	ot	b755	pt	b7101	ta	d4751	ot	b16710	sp	b420	n	b4552	sp	d510	pt	b1565	ta
b7301	pt	b7600	pt	b7101	ta	e1151	ot	b16710	sp	b420	ot	b530	dt	d5701	pt	b1565	ta
b7301	pt	b7800	pt	b7101	ta	e1200	ot	b16710	sp	b5105	sp	b530	ta	e340	n	b1565	ta
b7301	ta	d330	pt	b7101	ot	e5550	sp	b16710	sp	b7101	ot	b7301	pt	e340	n	b1565	ta
b7301	ot	d345	sp	b7101	ot	e5550	sp	b16710	sp	b7101	ot	d345	ot	e340	n	b1565	ot
b7301	ot	d4103	pt	b7101	ot	e5550	ot	b16710	sp	b7101	ot	d4751	ot	e340	pt	b1565	ot
b7301	ot	d4103	pt	b7101	pt			b16710	sp	b7301	ot	d4751	ot	e5700	sw	b1565	pt
b7301	pt	d4106	pt	b7101	ot			b4552	sp	b7301	ot	d5702	ot	e5701	pt	b1565	pt
b7301	pt	d4301	pt	b810	ot			b4552	ot	b7301	pt	d5702	sp			b1565	ta
b7401	ot	d4500	pt	b810	ot			b530	sp	b7301	ot	d6603	sp			b1565	ta
b7401	ot	d4500	pt	b810	ot			b530	dt	b7301	pt	e5502	ot			b1565	ta
b7401	pt	d4600	pt	d410	ot			b530	dt	b7301	pt	e5551	ot			b1565	ta
b7401	pt	d4602	pt	d4103	sp			b530	dt	b7301	pt	e5700	sw			b1565	ta
b7401	ta	d4602	pt	d4153	pt			b530	dt	b7301	pt					b1565	ot
b7401	ot	d4602	pt	d4200	ot			b810	ot	b7301	pt					b1565	pt
b7401	pt	d4603	pt	d5100	pt			d240	sw	b7301	pt					b1565	pt
b7600	ot	d4603	pt	d5100	pt			d420	pt	b7301	pt					b1565	pt
b7600	ot	s750	pt	d5100	ot			d6601	pt	b7301	ot					b1565	ot
b7600	ot	e310	sp	d5100	ta			d6604	ot	b7301	ot					b1565	ot
b7600	ot	e5800	sw	d5702	pt			d6300	ot	b7301	ta					b1565	ot
b7600	ot			d5702	pt			d6300	ot	b7301	ta					b1565	pt
b7600	ot			d6600	ot			d640	ot	b7301	ot					b1565	pt
b7600	pt			d6600	ot			e1101	n	b7301	ta					b1565	pt
b7600	pt			d6601	ot			e1151	ot	b7301	pt					b1565	ot
b7600	ta			d6601	pt			e1151	ot	b7301	ot					b1565	pt
b7600	ot			e110	dt			e1151	ot	b7301	pt					b1565	pt
b7600	ot			e115	ot			e1151	pt	b7301	ot					b1565	pt
d1550	ot			e1151	ta			e1151	pt	b7301	ot					b1644	ot
d1550	ot			e1151	ot			e1201	ot	b7301	ta					b7300	pt
d1550	ot			e1151	ot			e1201	ot	b7301	ot					b7301	pt
d1550	pt			e1151	ot			e1201	ot	b7301	ta					b7301	ta
d210	pt			e1151	ot			e1550	ot	b7301	ot					b7301	ta
d4103	ot			e1151	ot			e1550	ot	b7301	ta					b7351	ta
d4103	pt			e1201	ot			e1551	ot	b7301	ta					b7351	pt
d4751	ot			e1201	ot			e1650	sw	b7301	ot					b755	pt
e1201	pt			e1201	ot			e310	ot	b7301	pt					b7600	pt
e1550	ot			e1201	ot			e310	ot	b7301	ta					b7600	pt
e1550	ot			e1550	ot			e310	ot	b7301	ot					b7600	ta
e1650	ot			e1550	ot			e310	ot	b7301	ot					b7600	ta
e310	pt			e310	pt			e310	sp	b7301	ot					b770	pt
e310	pt			e310	pt			e310	sp	b7301	pt					b770	ot
e310	ot			e355	ot			e310	pt	b7301	ot					b770	pt
e310	pt			e355	ot			e310	pt	b7301	pt					b770	pt
e355	ot			e355	ot			e355	ot	b7301	pt					b7701	pt
e355	ot			e340	pt			e355	sw	b7301	ot					d325	ot
e355	pt			e340	ot			e340	n	b7302	pt					d325	ot
e355	ot			e340	ot			e355	sp	b7302	pt					d4100	pt
e5801	ot			e340	ot			e355	n	b7303	pt					d4103	ot
				e340	ot			e355	n	b7303	pt					d4103	ta
				e340	ot			e355	n	b7305	pt					d4103	pt
				e340	pt			e355	ot	b7305	pt					d4103	ta
				e355	ot			e355	n	b7305	pt					d4103	pt
				e355	ot			e355	n	b7305	pt					d4103	pt
				e355	pt			e355	n	b7305	pt					d4103	pt
				e355	pt			e355	n	b7305	ot					d4103	pt
				e5800	ot			e355	ot	b7305	ot					d4103	pt
				e5801	ot			e5151	ot	b7305	pt					d4103	pt
								e5250	ot	b7305	pt					d4103	pt
								e5250	ot	b7305	pt					d4106	pt
								e5801	ot	b7305	pt					d4153	pt
								e5801	ot	b7401	pt					d4600	pt

Appendix C

Categories identified as missing from the CICSS and EICSS

	Lemberg, 2010 (Doctors)	Glässel et al. 2010 (OT)	Glässel et al. 2011 (PT)	Glässel et al. (2012)
B122 Global psychosocial functions		*		
B220 sensations associated with the eye				*
B250 taste				*
B255 smell				*
B445 respiratory muscle functions			*	
B460 sensations associated with cardiovascular and respiratory functions	*			
B610 Urinary excretory functions	*			
B765 Involuntary movement functions	*	*	*	*
B720 mobility of bone functions		*	*	
B780 Sensations related to muscles and movements	*		*	*
B830 other functions of skin				*
B840 sensations related to the skin				*
S11001 temporal lobe		*		
S760 structure of trunk		*	*	*
S770 additional musculoskeletal structures		*	*	*
D 145 Learning to write			*	
D155 Acquiring skills		*		
D240 handling stress		*		
D355 Discussion				
D435 moving objects with lower extremities		*	*	*
D6102 furnishing a place to live		*		
D163 Thinking				*
D650 caring for household objects		*	*	*
D660 assisting others		*		*
D825 vocational training		*		
D840 apprenticeship		*		
D865 Complex economic transaction				*
E130 products and technology for education		*		
E140 Products for culture and sport		*	*	
E160 Products and technology of land development				*
E215 population				*
E220 Flora and fauna				*
E225 Climate				*
E330 people in positions of authority				*
E350 domesticated animals				*
E415 individual attitudes of extended family members				*
E430 Individual attitudes of people in positions of authority				*
E445 Individual attitudes of strangers				*
E535 communication services , systems and policies				*
E545 Civil protection services, systems and policies				*
NC Neglect	*		*	
NC Patient education/knowledge		*	*	
NC Posture and postural alignment		*	*	
NC Relaxation			*	
NC Reaction time				*

References

- Algurén, B., Lundgren-Nilsson, Å., & Sunnerhagen, K. (2010). Functioning of stroke survivors - A validation of the ICF core set for stroke in Sweden. *Disability and Rehabilitation*, 32(7), 551-559.
doi:10.3109/0963828090318335
- Algurén, B., Lundgren-Nilsson, Å., & Sunnerhagen, K. S. (2009). Facilitators and barriers of stroke survivors in the early post-stroke phase. *Disability and Rehabilitation*, 31(19), 1584-1591.
doi:10.1080/09638280802639004
- Allan, L. M., Rowan, E. N., Thomas, A. J., Polvikoski, J. T., O'Brien, J. T., & Kalaria, R. N. (2013). Long-term incidence of depression and predictors of depressive symptoms in older stroke survivors *British Journal of Psychiatry*, 203(6), 453-460. doi:0.1192/bjp.bp.113.128355
- Atkinson, H. L., & Nixon-Cave, K. (2011). A tool for clinical reasoning and reflection using the International Classification of Functioning, Disability and Health (ICF) framework and patient management model. *Physical Therapy*, 91(3), 416-430. doi:10.2522/ptj.20090226
- Auckland District Health Board. (2013). *Allied health services-community rehabilitation programme (CRP)*. Retrieved 17/02/2014, from <http://www.healthpoint.co.nz/specialists/community/a-links-home-health/allied-health-services-community-rehabilitation/>
- Björkdahl, A., Lundgren Nilsson, Å., Grimby, G., & Sunnerhagen, K. S. (2006). Does a short period of rehabilitation in the home setting facilitate functioning after stroke? A randomized control trial. *Clinical Rehabilitation*, 20, 1038-1049. doi:10.1177/0269215506071230
- Boldt, C., Brach, M., Grill, E., Berthou, A., Meister, K., Scheuringer, M., & Stucki, G. (2005). The ICF categories identified in nursing interventions

administered to neurological patients with post-acute rehabilitation needs. *Disability and Rehabilitation*, 27(7/8), 431-436.

doi:10.1080/09638280400014071

Burgess, N. G., Vyas, R., Hudson, J., Browne, O., Lee, Y. C., Jayathissa, S., & Thomson, T. (2012). Improved stroke care processes and outcomes following the institution of an acute stroke unit at a New Zealand district general hospital. *The New Zealand Medical Journal*, 125(1364), 37-46.

Carlson, P. M., Boudreau, M. L., Davis, J., Johnston, J., Lemsky, C., McColl, M. A., . . . Smith, C. (2006). 'Participate to learn': A promising practice for community ABI rehabilitation. *Brain Injury*, 20(11), 1111-1117.
doi:10.1080/02699050600955337

Cieza, A., Brockow, T., Ewert, T., Amman, E., Kollerits, B., Chatterji, S., . . . Stucki, G. (2002). Linking health-status measurements to the International Classification of Functioning, Disability and Health. *Journal of Rehabilitation Medicine*, 34(5), 205-210.
doi:10.1080/165019702760279170

Cieza, A., Ewert, T., Üstün, T. B., Chatterji, S., Kostanjsek, N., & Stucki, G. (2004). Development of ICF Core Sets for patients with chronic conditions. *Journal of Rehabilitation Medicine*, 36, 9-11.
doi:10.1080/16501960410015353

Cieza, A., Geyh, S., Chatterji, S., Kostanjsek, N., Üstün, B., & Stucki, G. (2005). ICF linking rules: An update based on lessons learned. *Journal of Rehabilitation Medicine*, 37(4), 212-218.
doi:10.1080/16501970510040263

- Collin, C., Wade, D. T., Davies, S., & Horne, V. (1988). The Barthel ADL Index: A reliability study. *Disability and Rehabilitation*, 10(2), 61-63.
doi:doi:10.3109/09638288809164103
- Egan, M., Davis, C. G., Dubouloz, C. J., Kessler, D., & Kubina, L. A. (2014). Participation and well-being poststroke: evidence of reciprocal effects. *Archives of Physical Medicine and Rehabilitation*, 95(2), 262-268.
doi:10.1016/j.apmr.2013.08.013
- Enliven Maximising Independence. (n.d.). *Auckland service centre info*.
Retrieved 18/02/2014, from <https://northern.enliven.org.nz/service-centres/auckland>
- Escorpizo, R., Stucki, G., Cieza, A., Davis, K., Stumbo, T., & Riddle, D. L. (2010). Creating an interface between the International classification of functioning, disability and health and physical therapist practice. *Physical Therapy*, 90(7), 1053-1063. doi:DOI:10.2522/ptj.20090326
- Ewert, T., Fuessl, M., Cieza, A., Andersen, C., Chatterji, S., Kostanjsek, N., & Stucki, G. (2004). Identification of the most common patient problems in patients with chronic conditions using the ICF checklist. *Journal of Rehabilitation Medicine*, 36, 22-29. doi:10.1080/16501960410015362
- Ewert, T., Grill, E., Bartholomeyczik, S., Finger, M., Mokrusch, T., Kostanjsek, N., & Stucki, G. (2005). ICF Core Set for patients with neurological conditions in the acute hospital. *Disability and Rehabilitation*, 27(7-8), 367-373. doi:10.1080/09638280400014014
- Fayed, N., Cieza, A., & Bickenbach, J. E. (2011). Linking health and health-related information to the ICF: A systematic review of the literature from 2001 to 2008. *Disability and Rehabilitation*, 33(21-22), 1941-1951.
doi:10.3109/09638288.2011.553704

Fletcher, K. (2013, June 14). Local stroke service would be inundated.

Manawatu Standard. Retrieved from

<http://www.stuff.co.nz/manawatu-standard/news/8796282/Local-stroke-service-would-be-inundated>

Furze, J., Nelson, K., O'Hare, M., Ortner, A., Threlkeld, A. J., & Jensen, G. M. (2013). Describing the clinical reasoning process: Application of a model of enablement to a pediatric case. *Physiotherapy Theory and Practice*, 29(3), 222-231. doi:10.3109/09593985.2012.727204

Geyh, S., Cieza, A., Schouten, J., Dickson, H., Frommelt, P., Omar, Z., . . . Stucki, G. (2004). ICF Core Sets for Stroke. *Journal of Rehabilitation Medicine Supplement*, 36(44), 135-141. doi:10.1080/16501960410016776

Geyh, S., Kurt, T., Brockow, T., Cieza, A., Ewert, T., Omar, Z., & Resch, K. (2004). Identifying the concepts contained in outcome measures of clinical trials on stroke using the International Classification of Functioning, Disability and Health as a reference. *Journal of Rehabilitation Medicine*, 36, 56-62. doi:10.1080/16501960410016776

Gladman, J., & Lincoln, N. (1994). Follow-up of a Controlled Trial of Domiciliary Stroke Rehabilitation (DOMINO Study). *Age and Ageing*, 23(1), 9-13. doi:10.1093/ageing/23.1.9

Gladman, J., Lincoln, N., & Barer, D. (1993). A randomised controlled trial of domiciliary and hospital-based rehabilitation for stroke patients after discharge from hospital. *Journal Of Neurology, Neurosurgery, And Psychiatry*, 56(9), 960-966. doi:10.1136/jnnp.56.9.960

Glässel, A., Coenen, M., Kollerits, B., & Cieza, A. (2012). Validation of the extended ICF core set for stroke from the patient perspective using

focus groups. *Disability and Rehabilitation*, 34(2), 157-166.

doi:10.3109/09638288.2011.593680

Glässel, A., Kirchberger, I., Kollerits, B., Amann, E., & Cieza, A. (2011).

Content validity of the Extended ICF Core Set for Stroke: An international Delphi survey of physical therapists. *Physical Therapy*, 91(8), 1211-1222. doi:10.2522/ptj.20100262

Glässel, A., Kirchberger, I., Linseisen, E., Stamm, T., Cieza, A., & Stucki, G.

(2010). Content validation of the International Classification of Functioning, Disability and Health (ICF) core set for stroke: The perspective of occupational therapists. *Canadian Journal of Occupational Therapy*, 77(5), 289-302. doi:10.2182/cjot.2010.77.5.5

Green, J., Forster, A., & Young, J. (2001). A test-retest reliability study of the Barthel Index, the Rivermead Mobility Index, the Nottingham Extended Activities of Daily Living Scale and the Frenchay Activities Index in stroke patients. *Disability and Rehabilitation*, 23(15), 670-676.

doi:10.1080/0963828011004538 2

Grill, E., Ewert, T., Chatterji, S., Kostanjsek, N., & Stucki, G. (2005). ICF Core Sets development for the acute hospital and early post-acute rehabilitation facilities. *Disability and Rehabilitation*, 27(7-8), 361-366.

doi:10.1080/09638280400013974

Grill, E., Huber, E. O., Stucki, G., Herceg, M., Fialka-Moser, V., & Quittan, M. (2005). Identification of relevant ICF categories by patients in the acute hospital. *Disability and Rehabilitation*, 27(7-8), 447-458.

doi:10.1080/09638280400014048

Grill, E., Lipp, B., Boldt, C., Stucki, G., & Koenig, E. (2005). Identification of relevant ICF categories by patients with neurological conditions in early

post-acute rehabilitation facilities. *Disability and Rehabilitation*, 27(7-8), 459-465. doi:10.1080/09638280400014063

Grill, E., Quittan, M., Huber, E. O., Boldt, C., & Stucki, G. (2005).

Identification of relevant ICF categories by health professionals in the acute hospital. *Disability and Rehabilitation*, 27(7-8), 437-445. doi:10.1080/09638280400014030

Grill, E., Stucki, G., Boldt, C., Joisten, S., & Swoboda, W. (2005). Identification of relevant ICF categories by geriatric patients in an early post-acute rehabilitation facility. *Disability and Rehabilitation*, 27(7-8), 467-473. doi:10.1080/09638280400014055

Health Improvement and Innovation Resource Centre. (2013). *Auckland Regional Community Stroke Study (ARCOS)*. Retrieved 17/02/2014, from <http://www.hiirc.org.nz/page/19353/auckland-regional-community-stroke-study/>

Health Research Council. (2002). *Guidelines on ethics in health research*.

Retrieved from

<http://www.hrc.govt.nz/sites/default/files/HRC%20Guidelines%20on%20Ethics%20in%20Health%20Research.pdf>

Heilman, K. M., Watson, R. T., & Valenstein, E. (2011). Neglect and related disorders. In K. M. Heilman & E. Valenstein (Eds.), *Clinical neuropsychology* (5th ed., Vol. 3, pp. 279-336). New York: Oxford University Press.

Hsueh, I. P., Lee, M. M., & Hsieh, C. L. (2001). Psychometric characteristics of the Barthel activities of daily living index in stroke patients. *Journal of the Formosan Medical Association*, 100(8), 526-532. Retrieved from <http://www.elsevier.com/locate/inca/708700>

- Korner-Bitensky, N., Desrosiers, J., & Rochette, A. (2008). A national survey of occupational therapists' practices related to participation post-stroke. *Journal of Rehabilitation Medicine*, 40(4), 291-297.
doi:10.2340/16501977-0167
- Kostanjsek, N., Rubinelli, S., Escorpizo, R., Cieza, A., Kennedy, C., Selb, M., . . . Ustun, T. B. (2011). Assessing the impact of health conditions using the ICF. *Disability and Rehabilitation*, 33(15-16), 1475-1482.
doi:10.3109/09638288.2010.527032
- Lemberg, I., Kirchberger, I., Stucki, G., & Cieza, A. (2010). The ICF Core Set for Stroke from the perspective of physicians: A worldwide validation study using the Delphi technique. *European Journal of Physical and Rehabilitation Medicine*, 46(3), 377-388. Retrieved from <http://www.minervamedica.it/en/journals/europa-medicophysica/index.php>
- Lincoln, N. B., Walker, M. F., Dixon, A., & Knights, P. (2004). Evaluation of a multiprofessional community stroke team: A randomized controlled trial. *Clinical Rehabilitation*, 18(1), 40-47.
doi:10.1191/0269215504cr700oa
- Mann, C. J. (2003). Observational research methods. Research design II: Cohort, cross sectional, and case-control studies. *Emergency Medicine Journal*, 20(1), 54-60. doi:10.1136/emj.20.1.54
- Marsala, C., & Petretto, D. M. (2010). Models of disability. In J. H. Stone & M. Blouin (Eds.), *International Encyclopedia of Rehabilitation*. New York: Center for International Rehabilitation Research Information and Exchange (CIRRIE).

- McNaughton, H., Feigin, V., Kerse, N., Barber, P. A., Weatherall, M., Bennett, D., . . . Anderson, C. (2011). Ethnicity and functional outcome after stroke. *Stroke*, 42(4), 960-964. doi:10.1161/strokeaha.110.605139
- McNaughton, H., Weatherall, M., McPherson, K., Taylor, W., & Harwood, M. (2002). The comparability of community outcomes for European and non-European survivors of stroke in New Zealand. *New Zealand Medical Journal*, 115(1149), 98-100. Retrieved from <http://www.nzma.org.nz/journal>
- Meesters, J., Hagel, S., Klokkeerd, M., Stovgaard, I., Bremander, A., Grotle, M., . . . Vlieland, T. V. (2013). Goal-setting in multidisciplinary team care for patients with rheumatoid arthritis: An international multi-centre evaluation of the contents using the International Classification of Functioning, Disability and Health as a reference. *Journal of Rehabilitation Medicine*, 45(9), 888-899. doi: 10.2340/16501977-1191
- Meyer, M., Britt, E., McHale, H. A., & Teasell, R. (2012). Length of stay benchmarks for inpatient rehabilitation after stroke. *Disability and Rehabilitation*, 34(13), 1077-1081. doi:10.3109/09638288.2011.63168
- Ministry of Health. (2012a). *Community health, transitional and support services-allied health services (non-inpatient) tier level two service specification*. Retrieved 15/02/2014, from <http://www.nsfl.health.govt.nz/apps/nsfl.nsf/pagesmh/472>
- Ministry of Health. (2012b). *Mortality and Demographic Data 2009*. Retrieved from <http://www.health.govt.nz/system/files/documents/publications/mortality-and-demographic-data-2009.pdf>

- Ministry of Health. (2013). *New Zealand Health Survey: Annual update of key findings 2012/13*. Retrieved from <http://www.health.govt.nz/publication/new-zealand-health-survey-annual-update-key-findings-2012-13>
- Minnemeier, M. (2011). *Neglect syndrome*. Retrieved February 18, 2014, from <http://www.springerreference.com/docs/html/chapterdbid/184105.html>
- Müller, M., Grill, E., Stier-Jarmer, M., Strobl, R., Gutenbrunner, C., Fialka-Moser, V., & Stucki, G. (2011). Validation of the comprehensive ICF Core Sets for patients receiving rehabilitation interventions in the acute care setting. *Journal of Rehabilitation Medicine: Official Journal of the UEMS European Board of Physical and Rehabilitation Medicine*, 43(2), 92-101. doi:10.2340/16501977-0622
- Müller, M., Stier-Jarmer, M., Quittan, M., Strobl, R., Stucki, G., & Grill, E. (2011). Validation of the comprehensive ICF core set for patients in post-acute rehabilitation facilities *Journal of Rehabilitation Medicine*, 43(2), 102-112. doi:10.2340/16501977-0659
- Paanalahti, M., Lundgren-Nilsson, A., Arndt, A., & Sunnerhagen, K. S. (2013). Applying the Comprehensive International Classification of Functioning, Disability and Health Core Sets for Stroke framework to stroke survivors living in the community. *Journal of Rehabilitation Medicine*, 45(4), 331-340. doi:10.2340/16501977-1110
- Ptyushkin, P., Vidmar, G., Burger, H., & Marincek, C. (2010). Use of the International Classification of Functioning, Disability and Health (ICF) in patients with traumatic brain injury. *Brain Injury*, 24(13-14), 1519-1527. doi:10.3109/02699052.2010.523054

- Riberto, M., Lopes, K. A. T., Chiappetta, L. M., Lourenção, M. I. P., & Battistella, L. R. (2013). The use of the comprehensive International Classification of Functioning, Disability and Health core set for stroke for chronic outpatients in three Brazilian rehabilitation facilities. *Disability and Rehabilitation*, 35(5), 367-374. doi:10.3109/09638288.2012.694573
- Scheuringer, M., Grill, E., Boldt, C., Mittrach, R., Mullner, P., & Stucki, G. (2005). Systematic review of measures and their concepts used in published studies focusing on rehabilitation in the acute hospital and in early post-acute rehabilitation facilities. *Disability and Rehabilitation*, 27(7-8), 419-429. doi:10.1080/09638280400014089
- Starrost, K., Geyh, S., Trautwein, A., Grunow, J., Caballos-Baumann, A., Prosiegel, M., . . . Cieza, A. (2008). Interrater reliability of the Extended ICF Core Set for Stroke applied by physical therapists. *Physical Therapy*, 88(7), 841-851. doi:10.2522/ptj.20070211
- Statistics New Zealand. (2006). *Quickstats about New Zealand identity and culture 2006 census*. Retrieved from <http://www.stats.govt.nz/Census/2006CensusHomePage/QuickStats/quickstats-about-a-subject/culture-and-identity.aspx>
- Statistics New Zealand. (2013). *2013 Census usually resident population counts-media release*. Retrieved 14/2/2014, from http://www.stats.govt.nz/browse_for_stats/population/census_counts/2013CensusUsuallyResidentPopulationCounts_MR2013Census.aspx
- Stier-Jarmer, M., Grill, E., Ewert, T., Bartholomeyczik, S., Finger, M., Mokrusch, T., . . . Stucki, G. (2005). ICF Core Set for patients with neurological conditions in early post-acute rehabilitation facilities.

Disability and Rehabilitation, 27(7/8), 389-395.

doi:10.1080/09638280400014022

Stroke Foundation of New Zealand and New Zealand Guidelines Group.

(2010). *Clinical Guidelines for Stroke Management 2010*. Retrieved from

<http://www.stroke.org.nz/node/59>

Stucki, G., Cieza, A., Ewert, T., Kostanjsek, N., Chatterji, S., & Üstün, T. B.

(2002). Application of the International Classification of Functioning, Disability and Health (ICF) in clinical practice. *Disability and Rehabilitation*, 24(5), 281-282.

doi:10.1080/10.1080/0963828011010522 2

Stucki, G., Ewert, T., & Cieza, A. (2002). Value and application of the ICF in rehabilitation medicine. *Disability and Rehabilitation*, 24(17), 932-938.

doi:10.1080/09638280210148594

Stucki, G., Ewert, T., & Cieza, A. (2003). Value and application of the ICF in rehabilitation medicine. *Disability and Rehabilitation*, 25(11/12), 628-634. doi:10.1080/09638280110070221

Tantilipikorn, P., Watter, P., & Prasertsukdee, S. (2012). Identifying assessment measures and interventions reported for Thai children with cerebral palsy using the ICF-CY framework. *Disability and Rehabilitation*, 34(14), 1178-1185. doi:10.3109/09638288.2011.637603

The Association of Educational Communications and Technology. (2001). 41.1 *What is descriptive research?* Retrieved February 19, 2014, from http://learn.gen.org/~aust/EdTecheBooks/AECT_HANDBOOK96/41/41-01.html

Tobias, M., Cheung, J., Carter, K., Anderson, C., & Feigin, V. L. (2007). Stroke surveillance: population-based estimates and projections for New

- Zealand. *Australian and New Zealand Journal of Public Health*, 31(6), 520-525. doi:10.1111/j.1753-6405.2007.00136.x
- Üstün, T. B., Chatterji, S., Bickenbach, J., Kostanjsek, N., & Schneider, M. (2003). The International Classification of Functioning, Disability and Health: A new tool for understanding disability and health. *Disability and Rehabilitation*, 25(11-12), 565-571. doi:10.1080/0963828031000137063
- Wade, D. T., & Hower, R. L. (1987). Functional abilities after stroke-measurement, natural-history and prognosis. *Journal of Neurology Neurosurgery and Psychiatry*, 50(2), 177-182. doi:10.1136/jnnp.50.2.177
- Weigl, M., Cieza, A., Andersen, C., Kollerits, B., Amann, E., & Stucki, G. (2004). Identification of relevant ICF categories in patients with chronic health conditions: A Delphi exercise. *Journal of Rehabilitation Medicine*, 36, 12-21. doi:10.1080/16501960410015443
- Weinrich, M., & Stuart, M. (2011). Coverage policy for neurorehabilitation: An international perspective. *Neurorehabilitation and Neural Repair*, 25(6), 531-539. doi:10.1177/1545968310397207
- Wiegand, N. M., Belting, J., Fekete, C., Gutenbrunner, C., & Reinhardt, J. D. (2012). All talk, no action?: The global diffusion and clinical implementation of the International Classification of Functioning, Disability, and Health. *American Journal of Physical Medicine and Rehabilitation*, 91(7), 550-560. doi:10.1097/PHM.0b013e31825597e5
- World Health Organization. (1980). International Classification of Impairments, Disabilities, and Handicaps. Retrieved from http://whqlibdoc.who.int/publications/1980/9241541261_eng.pdf

- World Health Organization. (2001). *International Classification of Functioning, Disability and Health*. Geneva: World Health Organization.
- World Health Organization. (2002). *Towards a common language of functioning, disability and health: ICF International Classification of Functioning Disability and Health*. Retrieved from <http://www.who.int/classifications/icf/icfbeginnersguide.pdf?ua=1>
- World Health Organization. (2014). *Implemented ICF Update Proposals 2014*. Retrieved 17/2/2014, from <http://www.who.int/classifications/icfupdates/en/index.html>
- Xiong, T., & Hartley, S. (2008). Challenges in linking health-status outcome measures and clinical assessment tools to the ICF. *Advances in Physiotherapy*, 10(3), 152-156. doi:10.1080/14038190802331401
- Ylvisaker, M., Hanks, R., & Johnson-Greene, D. (2002). Perspectives on rehabilitation of individuals with cognitive impairment after brain injury: Rationale for reconsideration of theoretical paradigms. *Journal of Head Trauma Rehabilitation*, 17(3), 191-209. doi:10.1097/00001199-200206000-00002